Five-Year Review Report

First Five-Year Review Report

For

Detroit Arsenal Tank Plant

Warren, Macomb County, MI

EPA ID: MI5210022781
MDEQ ID: Site DATP 95-42

PREPARED BY:
US Army Corps of Engineers
Louisville District
CELRL-ED-E

November 2004

Five-Year Review Report

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List of Acronyms

ABB	ABB Environmental Services, Inc.
AOC	Area of Concern
AREE	Area Requiring Environmental Evaluation
AST	Above Ground Storage Tank
BCT	BRAC Cleanup Team
BEC	BRAC Environmental Coordinator
BLS	Below Land Surface
BNA	Base/Neutral and Acid Extractables
BRAC	Base Realignment and Closure
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CLP	Contract Laboratory Program
COC	Chemical of Concern
COO	Certificate of Occupancy
COPC	Chemical of Potential Concern
CRP	Community Relations Plan
CSM	Conceptual Site Model
DATP	Detroit Arsenal Tank Plant
DCA	Dichloroethane
DCE	Dichloroethene
DD	Decision Document
EBS	Environmental Baseline Survey
ECC	Environmental Chemical Corporation
EE/CA	Environmental Engineering/Cost Analysis
EEI	Envirodyne Engineers, Inc.
EM	Electromagnetic
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
ERCE	Environmental and Energy Services Company, Inc.

EQC	Environmental Quality Company
ESE	Environmental Science & Engineering, Inc.
FDA	U.S. Food and Drug Administration
FEMA	Federal Emergency Management Agency
FOST	Finding of Suitability to Transfer
FS	Feasibility Study
GDLS	General Dynamics Land Systems
GOC	General Oil Company
GOCO	Government-owned, Contractor-operated
GPR	Ground Penetrating Radar
HI	Hazard Index
HSA	Hollow-stem Auger
LRC	Local Redevelopment Committee
LUST	Leaking Underground Storage Tank
MCL	Maximum Contaminant Level
MDDA	Metal Debris Disposal Area
MDEQ	Michigan Department of Environmental Quality
MEK	Methyl Ethyl Ketone
mg/L	Milligrams per Liter
MOA	Memorandum of Agreement
MPC	Marine Pollution Control
mph	Miles per Hour
msl	Mean Sea Level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NA	Not Applicable
NAER	Notice of Approved Environmental Remediation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPL	National Priorities List
NREPA	National Resources and Environmental Protection Act
O&M	Operation and Maintenance

OU	Operable Unit
OWDA	Oily Waste Disposal Area
OWS	Oil/Water Separator
PA	Public Act
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PID	Photoionization Detector
ppb	Parts per Billion
ppm	Parts per Million
PRG	Preliminary Remediation Goal
QC	Quality Control
RA	Remedial Action
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SPLP	Synthetic Precipitate Leaching Procedure
SSHP	Site-specific Health and Safety Plan
STL	Severn Trent Laboratories
SVOC	Semivolatile Organic Compound
TACOM	U.S. Army Tank-automotive and Armaments Command
TAL	Test America Laboratories
TAPP	Technical Assistance for Public Participation
TCE	Trichloroethene
TCLP	Toxicity Characteristics Leaching Procedure
TPH	Total Petroleum Hydrocarbon
TRV	Toxicity Reference Value
TSS	Total Suspended Solids

µg/L	Micrograms per Liter
USACE	U.S. Army Corps of Engineers
USATHMA	U.S. Army Toxic and Hazardous Materials Agency
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
VSR	Verification of Soil Remediation
WWTP	Wastewater Treatment Plant

Executive Summary

The trigger for this five-year review was the contamination found at the Detroit Arsenal Tank Plant (DATP) in seven locations in six of the Areas Requiring Environmental Evaluation (AREEs). The remedies for the seven areas were removal of contaminated soil. The remedy for the Metal Debris Disposal Area (MDDA) in the West Infield Disposal Areas at the former Tank Test Track of the Detroit Arsenal Tank Plant in Warren, Michigan included removal of the impacted soil and monitoring of the groundwater.

This Five-Year review found that the remedies are complying with the requirements of the State-Wide Decision Document/Remedial Action Plan. The remedies are functioning as designed.

The remedies are protective of human health and the environment, because the remedial actions at all operable units (OUs) are protective. Confirmatory soil sample analytical results from all the AREE areas indicate that the concentrations of Chemicals of Concern (COCs) were below the applicable cleanup criteria, Preliminary Remediation Goals (PRGs). The analytical results also indicate the sources of contamination have been removed.

Four years of groundwater monitoring at the former Metal Debris Disposal Area in AREE 29 has shown that the groundwater cleanup goals have been achieved by the removal of the contaminated soil. If results from the 2004 and 2005 annual groundwater monitoring continue to show no impact to the aquifer, the monitoring may be discontinued and the wells may be closed with MDEQ approval.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Detroit Arsenal Tank Plant		
EPA ID: MI5210022781	MDEQ ID: site DATP 95-42	
Region: 05	State: MI	City/County: Warren /Macomb
SITE STATUS		
NPL status: Non NPL		
Remediation status (choose all that apply): Complete		
Multiple OUs?* yes	Construction completion date: 08/02/2000	
Has site been put into reuse? yes		
REVIEW STATUS		
Lead agency: Michigan Department of Environmental Quality		
Author name: Karen Rabek		
Author title: Project Scientist	Author affiliation: USACE, Louisville District	
Five Year Review Period: 10/02/2000 to 10/02/2005		
Review period: 05/31/99 to 09/30/04		
Date(s) of site inspection: 08/31/2004		
Type of review: Policy		
Review number: 1 (first)		
Triggering action: Completion of backfill at the former Test Track Chrysler Disposal Area		
Triggering action date: 10/02/2000		
Due date *(five years after triggering action date)*: 10/02/2005		
Issues: There are no issues. Four years of groundwater sample analytical results indicate no impact to the aquifer. The wells are in excellent condition.		
Recommendations and Follow-up Actions: Recommendation is to continue the annual groundwater monitoring through 2005. If the analytical results continue to show no impact to the aquifer, with MDEQ approval, the sampling may be discontinued and the wells may be closed.		
Protectiveness Statement: The remedy at the Detroit Arsenal Tank Plant is protective of human health and the environment, because the remedial actions at all OUs are protective.		

* ["OU" refers to operable unit.]

Five-Year Review Report

I. Introduction

The Purpose of the Review

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

Authority for Conducting the Five-Year Review

The Agency is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Chapter 121 and the National Contingency Plan (NCP). CERCLA Chapter 121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The agency interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

Who Conducted the Five-Year Review

The U.S. Army Corps of Engineers, Karen Rabek, Tendai Charasika, and Josh Nickel of the Louisville District, have conducted a five-year review of the remedial actions implemented at the Detroit Arsenal Tank Plant in Warren, MI. This review was conducted from May 2004 through September 2004 for the period from October 2000 through October 2005. This report documents the results of the review. A full list of site inspection participants is provided in Attachment C.

Other Review Characteristics

This is the first Five-Year review for the Detroit Arsenal Tank Plant. The triggering action for this review is the completion of backfilling activities at the Metal Debris Disposal Area in the former Test Track Chrysler Disposal Area. The confirmatory soil sample analytical results had elevated TCE levels although the average concentrations were below the applicable cleanup levels. Therefore, a review is required to be conducted at least every five years.

II. Site Chronology

Table 1: Chronology of Site Events

Event	Date
U.S. Army and Chrysler Corporation selected parcel of land in Warren, MI as site of DATP.	1940
DATP produced U.S. M3, M4, and M26 tanks for WWII.	1940 - 1945
DATP became a GOCO facility.	1945
DATP produced M47 and M51 tanks for the Korean Conflict.	1951 - 1955
U.S. Army purchased additional property for Detroit Arsenal – The west side for TACOM peacetime research and development activities; the east side for manufacturing.	1952
DATP began production of M60 tanks.	1960
USATHMA conducted a records search to assess environmental quality. The fill area within the Test Track was identified as the most likely contaminated area. Major contaminants identified were heavy metals, petroleum products, and solvents.	1980
DATP began production of M1 Abrams Main Battle Tank	1981
Chrysler sold tank-manufacturing division to General Dynamics Land Systems (GDLS).	1982
Cole conducted study of Building 5 USTs. Chlorinated solvents, metals, and oil and grease were detected in soil and groundwater.	1984
EEI conducted a geophysical investigation of the Test Track, installed 18 wells, and conducted storm sewer monitoring. Sewers were found to have low-level contamination of oil and grease, chromium, iron, manganese, hydrocarbons, and trace solvents. Building 5 UST wells contained organic solvents and phenols. Test Track wells contained trace chlorinated solvents, hydrocarbons, and chromium.	1985
McDowell conducted soils investigation at the Hazardous Waste Storage Area, Buildings 4, 5,6 and 7. No significant contamination detected.	1985
USACE excavated Building 5 USTs and surrounding soils.	1988
Arthur D. Little performed quarterly monitoring (September and November) of wells and sewers, detected oil and grease and VOCs.	1988
Closure was granted for the Former Hazardous Waste Storage Area, Cole 1990.	1990
TACOM halted production of complete tanks.	1991
ERCE collected samples of sludge and solid material from Building 6 (Former WWTP) and analyzed samples using TCLP. All samples were non-hazardous.	1991
ESE removed Building S-59 waste oil UST and removed impacted soils.	1992

Table 1: Chronology of Site Events

Event	Date
ESE removed tanks from the Former Fuel Tank Farm and collected confirmatory samples. Ogden conducted a geophysical survey to detect fuel lines, a passive soil gas survey, and soil sampling for closure of the Fuel Tank Farm site. No significant contamination found.	1992
ABB conducted groundwater monitoring and pumping test. MW016 contained dichloropropane. Arsenic, antimony, iron, manganese, sodium, chloride, and sulfate exceeded criteria. VOCs and oil and grease were detected.	1993
JAYCOR conducted a preliminary Site Assessment. Spill sites and 10 other sites were identified as needing further investigation.	1993
TEC performed soil sampling and analysis at Buildings S-58 and S-59. TPH and TCE were detected.	1994
Manufacturing portion of the Detroit Arsenal was selected for closure in accordance with the BRAC Act.	1995
Sverdrup assessed groundwater contamination at the Former Fuel Tank Farm. Samples were analyzed for BTEX and PAHs; none were detected.	1995
Sverdrup investigated the Test Track Landfill. Toluene was detected in one SPLP soil sample. Low-level PAHs were detected in nine soil samples. Low-level pesticides were detected in 11 soil samples. PCBs were detected above background concentrations in soil. Four groundwater samples contained TCE. No SVOCs or pesticides/PCBs were detected in groundwater.	1995
DATP was shut down. All manufacturing operations discontinued.	1996
GDLS vacated property.	1997
SAIC conducted an Environmental Baseline Survey. Areas were identified where hazardous substances or petroleum products were stored, released, or disposed of. Sites were classified into seven CERFA categories. Forty AREEs were identified.	1997
SAIC performed the Remedial Investigation. The 40 AREEs identified in EBS were investigated. Results of field work were used to determine which AREEs required NFA and were suitable for transfer to the city of Warren, which were considered for removal actions and which could be evaluated by conducting site-specific human health and ecological risk assessments. Seven removal actions resulted.	1997
Montgomery Watson removed hydraulic hoist and contaminated soils from AREE 13, Building T-12. Closure for AREE 13 was obtained.	1998

Table 1: Chronology of Site Events

Event	Date
Montgomery Watson performed removal actions at AREE 2 (Building 4 sewer lines),14 (Structure S-25 Switchgear Housing for the Central Heating Plant), and 22 (Structure 60 Central Heating Plant Former ASTS). Closure was obtained for the three sites. Removal actions began in AREE 29 for the Oily Waste Area (OWA) and Metal Debris Disposal Area (MDDA).	1999
Montgomery Watson performed removal of additional contaminated soil in MDDA after soil samples continued to show contamination of TCE. Closure was obtained for the OWA.	2000
Montgomery Watson backfilled the MDDA with clean clay placed in 12 inch compacted lifts. SAIC installed three monitoring wells, one upgradient and two down gradient. Initial sampling did not detect VOCs above the cleanup goals.	2001
USACE performed quarterly groundwater monitoring of the MDDA wells. No significant detections were found.	2001 - 2002
MDEQ agreed to let Army scale back sampling at the MDDA to once annually.	January 27, 2003
USACE continued annual monitoring of MDDA wells.	2003 - 2004

III. Background

Physical Characteristics

The Detroit Arsenal is located in Warren, Michigan, in Macomb County approximately 12 miles north of downtown Detroit, in the southeastern part of Michigan's Lower Peninsula (see Figure 1). The installation was a 352-acre facility that was the headquarters for the U.S. Army Tank-automotive and Armaments Command (TACOM), a major subordinate command of the U. S. Army Materiel Command (AMC). The property was divided into east and west portions by the Conrail Railroad right-of-way. The western portion of the Arsenal is devoted to administrative and research activities. The 153-acre eastern portion, the Detroit Arsenal Tank Plant (DATP), was devoted to tank production, retrofitting, and support activities (see Figure 2). DATP was the single largest source of U.S. tanks (M3 and M4 tanks) during World War II. M-60 and M-1 Abrams tanks were produced there from 1960 until 1991, first by the Chrysler Corporation and then by General Dynamics Land Systems (GDLS). On February 28, 1995, the DATP was selected for closure under the Base Realignment and Closure (BRAC) Act. All manufacturing operations were discontinued in December 1996 and GDLS vacated the property in 1997.

The DATP is situated on a broad flat glacial lake plain. The outstanding topographic features of this area include Bear Creek, which runs to the west of the western boundary of the facility, and the flat relief of the site. The average elevation of the DATP is approximately 620 feet above mean sea level (msl) with a relief of less than 8 feet. The DATP portion of the Arsenal was almost completely paved. The exception was a small storage area in the northern part of the DATP and the interior of the tank test track. Macomb County is located on the southeastern flank of the Michigan Basin. Macomb County is part of the basin of glacial lakes formed during the Quaternary Epoch. Most of the county, including the Arsenal has been part of successive glacial advances and retreats during the Pleistocene Age. The basin consists of two main geologic groups: bedrock and glacial deposits. Bedrock consists of a thick sequence of consolidated sedimentary rocks, composed primarily of sandstone, limestone, dolomite, shale, and evaporates of Paleozoic Age. Glacial drift overlies the bedrock and was deposited as glaciers advanced and receded (EEI 1985) Glacial deposits are the principal source for groundwater in the area. However, in the area surrounding the Arsenal, the glacial deposits are mostly clayey lake beds that yield only small amounts of water, generally less than 10 gal/min. Most local domestic wells in glacial deposits are less than 175 feet deep, whereas some commercial and municipal wells in the area are 200 to 300 feet deep (USGS 1975).

Most of the residents in the basin use surface water obtained from the Detroit Metropolitan Water Department. The Detroit Metropolitan Water Department obtains its water from Lake Huron or the Detroit River (Sverdrup 1995b). Although well logs exist for nine wells within 1 mile of the Arsenal, all but two of these have been abandoned. The two wells are drawing from deeper glacial deposits (69 to 75 feet below land surface (BLS)), and based on the well logs may be monitoring (groundwater quality) wells. Some shallow driven wells are used for watering lawns located in subdivisions approximately ¾ mile west of the Arsenal. These wells are not used for drinking water purposes (Sverdrup 1995b).

Land and Resource Use

The DATP is located in a combined industrial/residential area. The industrial area is dominated by the automotive industry and includes metal fabrication plants, research laboratories, and scrap yards. Residential (single-family housing and mobile homes) and commercial property, schools, hospitals, and other properties associated with an urban environment are located all around the Arsenal boundary. Dense commercial, industrial, and residential land use extends to Utica (9 miles to the north), Lake St. Clair (8 miles to the east), the Canadian border (11 miles to the south), and through Novi (28 miles to the west).

The Detroit Arsenal is easily accessible by all forms of private and commercial transportation. A railroad yard provides rail service to the site, and an interstate highway is located immediately adjacent to the Arsenal.

In areas of the DATP not covered by pavement, vegetative cover exists. All vegetation has been introduced and no areas of natural vegetation exist at the DATP. No endangered or threatened plant species are present at the Arsenal. In addition, no wetlands are located at the Arsenal, and according to Federal Emergency Management Agency (FEMA) flood insurance maps, The DATP property is not located within the 100-year floodplain of Bear Creek (USACE 1991b).

The wildlife at the Arsenal Property is limited to rabbits, ducks, seagulls, foxes, pheasants, woodchucks, and other small animals that have adapted to the urbanized environment. Non-poisonous snakes occasionally are seen in the area (USATHAMA 1980). No endangered or threatened species reside on the Arsenal, and no endangered or threatened migratory birds use the Arsenal as a habitat (USACE 1991).

History of Contamination

The production of tanks at the DATP involved using and storing solvents and petroleum products. The Test Track Chrysler Disposal Area was reportedly used for the disposal of various manufacturing by-products including electroplating wastes, waste solvents, waste cyanides, and chrome plating wastes. Construction debris and sludges were also reported to have been disposed of in this area. Several investigations were performed at the Detroit Arsenal and are summarized in Table 2.

Table 2: Summary of Relevant Previous Investigations and Remedial Actions Detroit Arsenal Tank Plant, Warren, Michigan

Investigation	Summary
USATHAMA 1980 Installation Assessment	Conducted a records search to assess environmental quality. Identified the most likely contaminated area as the fill area within the Test Track. Major contaminant groups identifies as heavy metals, petroleum products, and solvents.
Cole 1984a Building 5 UST Study	Conducted a study to evaluate the potential for Building 5 USTs to have leaked. Soil borings and monitoring wells were drilled. Chlorinated solvents, metals, and oil and grease were detected in the groundwater and soil.
EEI 1985 Environmental Contamination Survey	Conducted a geophysical investigation at the Test Tract. Installed 18 wells. Groundwater was encountered at a 5 to 14 feet BLS. Conducted storm sewer monitoring. Low-level contamination was detected in sewers: oil and grease, chromium, iron, manganese, hydrocarbons, and trace solvents. The metals were above criteria. The groundwater investigation focused on the Building 5 USTs and the Test Track Disposal Area. The Building 5 UST wells contained organic solvents and phenols (thought to be from another source). Lead and chromium were above criteria. The Test Track wells contained trace chlorinated solvents, hydrocarbons, and chromium. Chromium in MX004 was six times greater than criteria.
USACE 1988 Building 5 UST Remediation	Excavated the Building USTs and surrounding soils. Recommended continued groundwater monitoring.
McDowell 1985 Soils Investigation	Collected 17 samples from areas around the Former WWTP (Building 6), the Building 5 USTs, the Hazardous Waste Storage Area, building 7, and inside Building 4. Borings varied in depth from 2 to 35 feet BLS. Samples were analyzed for selected leachable metals. No significant contamination was detected.
Arthur D. Little 1988 Quarterly Monitoring	Conducted well and sewer monitoring in September and November 1988. Oil and grease were detected in MW002, MW010, and MW016. VOCs were detected in MW002 and MW016
Dames and More 1990 Final Report for Quarterly Monitoring	Conducted three rounds of quarterly groundwater and storm sewer monitoring in January, May, and July 1990. The focus was Building 5 USTs and the Test Track Disposal Area. Contaminants were detected above MCLs in wells at both areas. Cyanide, metals, and oil and grease were detected in storm sewers.
Cole 1990 Closure Certification Report, Hazardous Materials Storage Area	This report summarized previous sampling at the site. Samples have been collected for closure of the Former Hazardous Waste Storage Area. In 1987, 10 borings, 6 of which were background, were drilled and sampled (2 samples per boring). Contamination was detected and remediation occurred. Additional samples were collected in 1988 and 1989 and closure was granted.
ERCE 1991 Building 6 and Waste Separation Area Sampling Results	Collected samples of sludge and solid material from Building 6 (Former WWTP) and analyzed samples using TCLP. All samples were non-hazardous.
ESE 1992 Building S-59 UST Removal	Removed the waste oil UST and collected 40 samples from the excavation. Samples were analyzed for PAHs, PCBs, lead, cadmium, and chromium. All impacted soil was removed.
ESE 1992 Ogden 1992 Former Fuel Tank Form Investigations	ESE removed the tanks and collected confirmatory samples. Ogden conducted a geophysical survey to detect fuel lines, a passive soil gas survey, and soil sampling for closure of the site and concluded that no significant contamination existed.
ABB 1993 Monitoring and Pumping Test Program	Collected seven groundwater samples during two rounds of sampling (January and April). Sampled for VOCs, BNAs, dissolved metals, chloride, sulfate, and oil and grease. Conducted a stepped-drawdown and pumping test on two wells. MW016 contained dichloropropane above the MCL. Arsenic, antimony, iron, manganese, sodium, chloride, and sulfate exceeded criteria. CVOCs were detected in MW002 and MW016. Oil and grease were detected in MW002, MW004, MW010, and MW016.
JAYCOR 1993 Preliminary Site Assessment	Conducted a records review, employee interviews, and visual inspections to summarize facility conditions and examine past activities to determine if environmental liabilities existed. Spill site and 10 other sites were identified as needing further investigation.

Table 2: Summary of Relevant Previous Investigations and Remedial Actions Detroit Arsenal Tank Plant, Warren, Michigan

Investigation	Summary
TEC 1994 Soil Sampling and Analysis Building S-58 and S-59	Drilled nine 8-foot borings within and around Building S-58 and S-59 to establish background contaminant concentrations prior to establishing proposed hazardous waste storage areas within the buildings. Samples were collected at 3-foot intervals and analyzed for TPH and PCBs and by TCLP. TPH was detected at a maximum concentration of 413 ppm. And TCE was detected at a maximum leachable concentration of 12 ppb.
Sverdrup 1995a Groundwater Contamination Assessment – Former Fuel Tank Farm	Drilled three soil borings, two of which were dry. Only MW019 (the upgradient location) was completed as well. Analyzed for BTEX and PAHs. No BTEX or PAHs were detected.
Sverdrup 1995b Draft Closure Report for the Test Track Landfill	Drilled 11 borings and collected 33 samples. Analyzed four samples by SPLP. Collected eight background samples from four borings and two background SPLP samples. Installed MW020, MW021, and MW022. Collected seven groundwater samples. Toluene was detected in one SPLP soil sample. Low-level PAHs were detected in nine soil samples. Low-level pesticides were detected in 11 soil samples. PCBs were detected above background concentrations in soil. Four groundwater samples contained TCE. No SVOCs or pesticides/PCBs were detected in groundwater.
SAIC 1997a Environmental Baseline Survey	Reviewed records, aerial photographs, regulatory information, and title documents. Conducted interviews and visual surveys. Identified areas where hazardous substances or petroleum products were stored, released or disposed of. Classified sites into seven CERFA categories. Identified 40 AREEs.
SAIC 1999a Final Remedial Investigation Report for the Detroit Arsenal Tank Plant	40 AREEs identified in EBS were investigated. Results of field work were used to determine which AREEs required NFA and suitable for transfer to the city of Warren, which were considered for removal actions and which could be evaluated by conducting site-specific human health and ecological risk assessments. Seven removal actions resulted.
Montgomery Watson 1998 Closure Report Building T-12	Removal of hydraulic hoist and contaminated soil from Bldg T-12, AREE 13. Confirmatory sampling analytical results indicated that source of contamination has been removed and concentrations of COCs were below cleanup criteria.
SAIC 1999b Base Realignment and Closure (BRAC) Cleanup Plan	Defined BRAC Cleanup team, term, goals, and schedules for Fast track and presented Reuse Plan presented by the city of Warren Local Reuse committee.
Montgomery Watson 1999 Final Closure Report Remaining Sites (AREE 2, 14, 22)	Removal of contaminated soil in AREEs 2, 14, and 22. Confirmatory sampling analytical results indicated that sources of contamination have been removed and concentrations of COCs were below cleanup criteria.
Montgomery Watson 2000 Final Closure Report Oily Waste Disposal Area	Removal of contaminated soil in the OWDA of AREE 29. Confirmatory sampling analytical results indicated that source of contamination has been removed and concentrations of COCs were below cleanup criteria.
SAIC 2001 Site-Wide Decision Document/Remedial Action Plan	U.S. Army's assessment of the environmental condition of the DATP. Document supports final transfer of the DATP property
Montgomery Watson 2001 Final Closure Report Metal Debris Disposal Area	Removal of contaminated soil in the MDDA of AREE 29. Confirmatory sampling analytical results indicated that source of contamination has been removed and average concentrations of COCs were below cleanup criteria. MDEQ required installation and monitoring of three deep wells because of "hot spots" that remained.

Initial Response

The Environmental Baseline Survey conducted by SAIC (1997) had identified forty AREEs, (see Figure 3). The Remedial Investigation concluded that seven sites required the removal of contaminated soils: AREE 2 – Building 4 Sewerlines, AREE 13 – Building T-12 Hydraulic Lifts, AREE 14 - Structure 25 Switchgear Housing, AREE 22 - Structure 60 Central Heating Plant Former Aboveground Storage Tanks, and AREE 29 – Oily Waste Disposal Area (OWDA) and Metal Debris Disposal Area (MDDA).

The removal actions at these sub-AREEs involved excavating contaminated soil, transporting and disposing of contaminated soil at an approved offsite facility, and collecting confirmatory soil samples.

Basis for Taking Action

Table 3 below contains the remedial action objectives for the sub-AREEs at which they occurred.

Table 3: Remedial Action Objectives

AREE #	Exposure Unit	Remedial Action Objective
2	Building 4 Sewerlines (MW-02-004 Area)	To reduce TCE and vinyl chloride concentrations in the subsurface soil below the relevant PRGs
13	Building T-12 Hydraulic Lifts	To reduce TCE concentrations in the subsurface soil below the relevant PRGs
14	Structure S-25 Switchgear Housing	To reduce PCB-1260 concentrations in the vicinity of SB-14-002 below the relevant PRG
15	Building 26 Fueling Pump Station	To remove the two USTs and any impacted soil
22	Structure 60 Central Heating Plant Former ASTs	To reduce PAH and vinyl chloride concentrations in the subsurface soils below the relevant PRGs
29	Oily Waste Disposal Area	To reduce benzo(a)pyrene and TCE concentrations in the subsurface soil below the relevant PRGs
29	Metal Debris Disposal Area	To reduce subsurface VOC concentrations below the relevant PRGs

IV. Remedial Actions

AREE 2 Building 4 Sewerlines (MW-02-004 Area)

Prior to initiating excavation activities at the AREE 2 Building 4 Sewerlines (MW-02-004 Area), existing utilities in the area were located and marked to avoid or minimize disturbance during excavation of the soil. The areas were flagged and marked as appropriate to distinguish the areas to be excavated. Excavated soil was stockpiled in roll-off dumpsters, which were staged adjacent to the excavation areas. The removed soils were removed from the sites until no visual, olfactory, or photo ionization detector (PID) indications of soil contamination were observed. The excavation at the AREE2 Building 4 Sewerlines was approximately 30 feet long by 24 feet wide by 20 feet deep (520 yd^3). Groundwater was not encountered during excavation activities or within the excavation prior to backfilling activities (Montgomery Watson 1999).

One composite sample was collected from the excavated soil. The sample was analyzed for flash point, corrosiveness (pH), reactive sulfide, reactive cyanide, total polychlorinated biphenyls (PCBs), toxicity characteristic leaching procedure (TCLP) volatiles, TCLP semivolatiles, TCLP metals, TCLP herbicides, and TCLP pesticides. Sample results were assessed to confirm that the appropriate disposal method was landfilling as a non-hazardous waste. Impacted soils were transported and disposed of by the Environmental Quality Company (EQC) of Belleville, Michigan. A total of 520 yd^3 of soil was disposed of from AREE 2. Excavated soils were disposed of as a non-hazardous waste at the Sauk Trail Hills Development Landfill in Canton, Michigan. Pretreatment prior to soil disposal was not necessary (Montgomery Watson 1999).

Two bottom and four sidewall samples were collected from the AREE 2 excavation. Samples were collected from those locations most likely to have elevated VOC concentrations. Samples were collected immediately as excavation activities progressed just prior to backfilling. The stability of the excavation was not suitable to leave open for any extended period as sidewall cave-ins commenced immediately upon removal of soils. Samples were collected following MDEQ guidelines for VOC, polynuclear aromatic hydrocarbon (PAH), and PCB soil sampling (EPA SW-846 Method 5035/8260, EPA Contract Laboratory Program (CLP) Methods OLM3.1P and OLM3.1S) (Montgomery Watson 1999).

All materials, debris, tools, and machinery were removed from the site upon completion of the work. The site was restored to existing conditions or better. The excavation at AREE 2 was backfilled with gravel and the asphalt was replaced in September 1999 (Montgomery Watson 1999). Confirmatory soil sample analytical results indicate the concentrations of TCE and vinyl chloride were below applicable cleanup criteria (PRGs). The analytical results also indicate the source of contamination was removed. The removal actions adequately protect human health and the environment in addition to adequately preparing the area for transfer and for future industrial and/or commercial land use as intended (SAIC 2001).

AREE 13 Building T-12 Hydraulic Lifts

Prior to initiating remediation activities at the AREE 13 Building T-12 Hydraulic Lifts, existing utilities in the area were located and marked to avoid or minimize disturbance during excavation activities. A 10-foot long by 8-foot high portion of a wooden partition wall was removed to allow excavation of contaminated soil located beneath the wall. The wall was taken down by hand and the debris was left in the building to be removed during future planned demolition of Building T-12. The concrete section of floor was marked, sawcut, broken up with a jackhammer, and removed with a backhoe. The concrete was removed from the site and recycled at a local concrete recycler. Approximately 25 gallons of hydraulic fluids were removed using a portable vacuum pump and contained in a 55-gallon drum. Upon completion of hoist removal activities, the accumulated hydraulic fluids were recycled as waste oil. The aboveground air supply piping to the hydraulic lift was disconnected from the hoist. Eight 55-gallon drums of water were collected from the hoist pit. Groundwater in the hoist pit was removed prior to hoist removal via a portable vacuum pump. The hydraulic hoist and associated underground piping and appurtenances were removed from the ground using a backhoe. The hoist and associated parts were hauled offsite and recycled as scrap metal. The soil was excavated after removal of the concrete floor and the hydraulic hoist. Soil was removed to a depth at which no visual or olfactory contamination remained and no positive PID readings occurred. Approximately 140 cubic yards were removed and disposed of in a licensed hazardous waste landfill. The approximate excavation dimensions were 14 feet wide by 23 feet long by 14 feet deep. EQC received the soil on July 9, 1998. Groundwater was not encountered during the initial soil excavation activities (Montgomery Watson 1998).

Confirmatory soil samples were collected and analyzed to confirm that the concentrations of the chemicals of concern (COCs) at the site were below the regulatory criteria. Two samples were collected from the bottom of the pit and four samples were collected from the walls of the pit on May 13, 1998. Another composite soil sample was collected on May 26, 1998 when a discolored seam appeared approximately 8 to 10 feet BLS. Samples were collected following MDEQ guidelines for high- and low-level VOC soil sampling (EPA SW-846 Method 5035/8260B) using an EnCore sampler (Montgomery Watson 1998).

The materials/waste disposed of from the remediation included broken concrete (less than 20 yd^3), impacted oils (approximately 25 gallons), and groundwater (approximately 8,100 gallons). Contaminated soils were disposed of as a listed hazardous waste at the EQC due to TCE contamination. Pretreatment prior to soil disposal was performed directly by the disposal facility. The groundwater was disposed of as a non-hazardous waste at Edward's Oil. All materials, debris, tools, and machinery were removed from the site upon completion of the work. The site was restored to existing conditions or better. The excavation was backfilled with peastone to grade and the concrete floor was replaced. A final site walk through was conducted with U.S. Army personnel to confirm acceptability of final site conditions (Montgomery Watson 1998).

Confirmatory soil sample analytical results indicate the concentrations for the COC were below applicable cleanup criteria (PRGs). The analytical results also indicate the source of contamination has been removed. The removal actions adequately protect human health and the environment in addition to adequately preparing the area for transfer and for future industrial and/or commercial land use as intended (SAIC 2001).

AREE 14, Structure S-25 Switchgear Housing

Prior to initiating excavation activities at AREE 14, the Structure S-25 Switchgear Housing, existing utilities in the area were located and marked to avoid or minimize disturbance during excavation of the soil. The area was marked and the soil was removed in a strip on the north side of Structure S-25. The strip of soil removed was approximately 12 feet long by 1 foot wide by 1 foot deep (1/2 yd^3). Groundwater was not encountered during excavation activities or within the excavation prior to backfilling activities (Montgomery Watson 1999).

One composite sample was collected from the excavated soil. The sample was analyzed for flash point, corrosiveness (pH), reactive sulfide, reactive cyanide, total PCBs, TCLP volatiles, TCLP semivolatiles, TCLP metals, TCLP herbicides, and TCLP pesticides. Sample results were assessed to confirm that the appropriate disposal method was landfilling as a non-hazardous waste. Impacted soils were transported and disposed of by EQC. A total of ½ yd^3 of soil was disposed of from AREE 14. Excavated soils were disposed of as non-hazardous waste at the Sauk Trail Hills Development Landfill in Canton, Michigan. Pretreatment prior to soil disposal was not necessary (Montgomery Watson 1999).

Following excavation, two bottom samples were collected at AREE 14 because the excavation was only 1 foot deep. Samples were collected following MDEQ guidelines for VOC, PAH, and PCB soil sampling (EPA SW-846 Method 5035/8620, EPA CLP Methods OLM3.1P and OLM3.1S) (Montgomery Watson 1999).

All materials, debris, tools, and machinery were removed from the site upon completion of the work. The site was restored to existing conditions or better. The excavated area was backfilled with imported fill. A final site walk-through was conducted with U.S. Army personnel to confirm acceptability of final site conditions at AREE 14 (Montgomery Watson 1999).

Confirmatory soil sample analytical results indicate the concentrations for the COC were below applicable cleanup criteria (PRGs). The analytical results also indicate the source of

contamination has been removed. The removal actions adequately protect human health and the environment in addition to adequately preparing the area for industrial and/or commercial land use as intended (SAIC 2001).

AREE 15, Building 26 Fueling Station Pump House

As part of the initial response and tank removal activities conducted at AREE 15, the Building 26 Fueling Station Pump House, the underground storage tanks (USTs) were removed and impacted soil was excavated. In order to confirm that remediation goals were achieved, soil borings were drilled and floor and wall samples also were collected from the UST excavation. Five hollow-stem auger (HSA) soil borings were installed at locations surrounding the excavation to 22 feet BLS. Eight Geoprobe* borings were advanced in the same area to 17 feet BLS. Groundwater was not observed outside the UST basin during the investigations associated with this release (Cassidy 1997).

Approximately 800 yd^3 of impacted soil and a mixture of 10 gallons free product/1,500 gallons water were removed for disposal. An additional 16,000 gallons of surface runoff, with no sign of free product, also were removed for disposal (Cassidy 1997).

The analytical results for all soil samples collected for the closure of the excavation and soil closure verification were below the required MDEQ Tier 1 Residential Direct Contact Criteria. The maximum remaining VOC and SVOC concentrations in the soil were compared to MDEQ criteria for risk-based corrective action at leaking underground storage tank (LUST) sites. All concentrations were below the LUST site direct contact criteria (Cassidy 1997). Therefore, the remediation of this release was achieved and the applicable environmental work is complete (SAIC 2001).

AREE 22, Structure 60 Central Heating Plant Former Aboveground Storage Tanks

Prior to initiating excavation activities at the Structure 60 Central Heating Plant Former ASTs, existing utilities in the area were located and marked to avoid or minimize disturbance during excavation of the soil. AREE 22 was flagged and marked as appropriate to distinguish the areas to be excavated. Excavated soil was stockpiled in roll-off dumpsters, which were staged adjacent to the excavation areas. The soils were removed from the sites until no visual, olfactory, or PID indications of soil contamination were observed. The excavation at the former AST area was approximately 30 feet long by 20 feet wide by 4 feet deep (89 yd^3). The strip of soil excavated from the refueling area along the railroad tracks was approximately 38 feet long by 3.5 feet wide by 4 feet deep (20 yd^3). Groundwater was not encountered during excavation activities or within the excavation prior to backfilling activities (Montgomery Watson 1999).

One composite sample was collected from the excavated soil. Each sample was analyzed for flash point, corrosiveness (pH), reactive sulfide, reactive cyanide, total PCBs, TCLP volatiles, TCLP semivolatiles, TCLP metals, TCLP herbicides, and TCLP pesticides. Sample results were assessed to confirm that the appropriate disposal method was landfilling as a non-hazardous waste. Impacted soils were transported and disposed of by EQC. A total of 109 yd^3 of soil was disposed of from AREE 22. Excavated soils were disposed of as a non-hazardous waste at the Sauk Trail Hills Development Landfill in Canton, Michigan. Pretreatment prior to soil disposal was not necessary (Montgomery Watson 1999).

Following excavation, 12 soil samples were collected to confirm success of the source removal. In the former AST area, four samples were collected from the sidewall and two samples were collected from the bottom of the excavation pit. Three samples were collected from the sidewall and three bottom samples were collected from the excavation pit along the railroad tracks. No east sidewall samples were collected as this edge of the excavation was the concrete apron of the

utility corridor adjacent to the excavation. Samples were collected following MDEQ guidelines for VOC, PAH, and PCB soil sampling (EPA SW-846 Method 5035/8260, EPA CLP Methods OLM3.1 P and OLM3.1 S) (Montgomery Watson 1999).

All materials, debris, tools, and machinery were removed from the site upon completion of the work. The site was restored to existing conditions or better. The excavated area was backfilled with imported fill. A final site walk-through was conducted with U.S. Army personnel to confirm acceptability of final site conditions at AREE 22 (Montgomery Watson 1999).

Confirmatory soil sample analytical results indicate the concentrations for the COCs were below applicable cleanup criteria (PRGs). The analytical results also indicate the source of contamination was removed. The removal actions adequately protect human health and the environment in addition to adequately preparing the area for transfer and for future industrial and/or commercial land use as intended (SAIC 2001).

AREE 29 Oily Waste Disposal Area

Prior to initiating remediation activities at the AREE 29 OWDA, existing utilities in the area were located and marked to avoid or minimize disturbance during excavation activities. The areas were flagged and marked as appropriate to distinguish the areas to be excavated. Where soil staging was required, the soil was staged within the excavation area so as not to impact surrounding soils. Excavation shoring to prevent undermining of existing footings or foundations was not necessary during excavation activities due to excavation depth, shape, and location. The excavated soils requiring offsite disposal were visually assessed for water content. Based on the visual assessment, excavated soils did not require dewatering prior to hauling offsite for disposal. Approximately 1,818 yd^3 of soil were excavated from the OWDA. Groundwater encountered in the excavation was pumped out using vacuum trucks and transported offsite to the approved disposal facility. Approximately 40,000 gallons of groundwater and collected precipitation were removed from the OWDA excavations and disposed of by EQC (Montgomery Watson 2000).

Representative soil samples were collected from each area for waste characterization analyses. One composite sample was collected from the stockpiled materials associated with each of the three excavations. Each sample was analyzed for flash point, corrosiveness (pH), reactive sulfide, reactive cyanide, total PCBs, TCLP volatiles, TCLP semivolatiles, TCLP metals, TCLP herbicides, and TCLP pesticides. Sample results indicated that landfilling, as a non-hazardous waste without pretreatment, was an appropriate disposal method. Impacted soils were transported and disposed of by EQC. Waste characterization sampling and analyses were conducted directly by EQC as appropriate for waste disposal purposes. A total of 3,190 tons of excavated soils was disposed of as a non-hazardous waste at the Sauk Trail Hills Landfill in Canton, Michigan. Pretreatment prior to soil disposal was not necessary (Montgomery Watson 2000).

Thirteen bottom and 18 sidewall samples were collected from the OWDA. In addition, one duplicate sample for every 10 confirmatory samples was collected, and one matrix spike/matrix spike duplicate (MS/MSD) for every 20 confirmatory samples was collected for quality control purposes. Samples were collected on September 2, 1999 following the MDEQ guidelines for high and low level VOC and PAH soil sampling (EPA SW-846 Methods 5035/8260B and 3550B/8270) (Montgomery Watson 2000).

All materials, debris, tools, and machinery were removed from the site upon completion of the work. The site was restored to existing conditions or better. The excavations were backfilled with clean imported fill. A final site walk-through was conducted with U.S. Army personnel to confirm acceptability of final site conditions at the OWDA (Montgomery Watson 2000).

Confirmatory soil sample analytical results indicate the concentrations for the COCs were below applicable cleanup criteria (PRGs). The analytical results also indicate the source of

contamination has been removed. The removal actions adequately protect human health and the environment in addition to adequately preparing the area for transfer and for future industrial and/or commercial land use as intended (SAIC 2001).

AREE 29, Metal Debris Disposal Area

The AREE 29 MDDA was the largest and most significantly contaminated sub-AREE at DATP. Contamination at this sub-AREE extended to depths greater than 30 feet BLS. The soil leaching to groundwater pathway was considered during PRG development and cleanup at the MDDA. Consequently, PRG development for this sub-AREE used contaminant migration modeling methods to develop goals protective of human health. The development of PRGs for the MDDA and the removal action activities are described in the following paragraphs.

PRG Development - In addition to the generic MDEQ cleanup criteria, site-specific PRGs for TCE and vinyl chloride in soil were developed as cleanup targets to support the remedial objectives of preventing direct contact exposures, leaching to the regional groundwater, and migration of vapors through the soil to outdoor and indoor receptors at the land surface. The site-specific PRGs account for the thickness of the soil layer that separates receptors from the contaminant source in the soil. For leaching to groundwater, the receptor is the regional groundwater; for migration of vapors, the receptors are people at the soil surface. The direct contact exposures are for people coming into direct contact with the soil.

The PRG that is protective of leaching to groundwater is an average concentration of 18 mg/kg of TCE in the most contaminated soil layer, which was located at 26 to 35 feet BLS. The use of an average is intended to allow for the existence of occasional high and low concentrations, understanding that the natural leaching process will tend to integrate such variations over distance. The PRG for indoor vapors (which is more restrictive than for ambient vapors) is based on a building area of 4,000 ft^2, which was determined by MDEQ to be the appropriate building size to assume, in lieu of an existing building (MDEQ 1997).

The PRGs for the MDDA are as follows:

- Protection of inhalation of ambient air (for 5m thick source of contamination) - 440 mg/kg for TCE and 9 mg/kg for vinyl chloride (MDEQ generic criteria).
- Protection of inhalation of indoor and ambient air – depth-dependent value corresponding to a building area of 40,000 ft^2 calculated for site-specific conditions (see Figure 4 for TCE and Figure 5 for vinyl chloride).
- Migration to groundwater – an average of 18 mg/kg TCE in the 26- to 34-foot BLS soil layer calculated for site specific conditions (see Figure 6).

Removal Action – In 1998 and 1999, Montgomery Watson excavated an area of approximately 16, 375 ft^2 to remove soil contaminated with VOCs at the AREE 29 MDDA. The excavation reached a depth of approximately 20 feet BLS. This stage of remediation was conducted in two phases, the first in the fall of 1998 and the second in February 1999. Confirmatory sampling conducted after both phases of the removal action indicated that excessive VOC contamination remained. In February 1999, SAIC was subcontracted by Montgomery Watson to investigate the horizontal and vertical extent of VOCs in and around the remediation site (Phase III of the RI). This Phase III investigation was conducted to provide information to be used to decide the extent of contamination and remaining soil requiring excavation.

During Phase IIIA, 12 soil borings were drilled in and around the MDDA excavation and subsurface soil samples were collected from each boring. Three borings (SB-29-017, SB-29-018, and

SB-29-019) were drilled inside the excavation below the excavation floor; nine borings were drilled outside the excavation. The total depth of the borings extended to a minimum of 30 feet and a maximum of 70 feet BLS.

Thirteen VOCs were detected in the Phase IIIA soil samples collected from the MDDA borings. The VOCs detected in more than half of the samples were acetone, toluene, and TCE. The concentrations of acetone and toluene, however, were all less than 0.130 ppm. The maximum concentrations of vinyl chloride and cis-1,2-dichloroethene (DCE) were 2.18 and 64 ppm, respectively. TCE was detected in 87 percent of the samples (46 samples), at a maximum concentration of 1,040 ppm (SB-29-026, 20 feet BLS). The highest concentrations of TCE were detected at 20 to 35 feet BLS.

Follow-up Phase IIIB investigative activities took place at the MDDA in November 1999 and January 2000. SAIC sampled subsurface soil during both of these time periods to further delineate contaminated areas and determine the extent of contaminated soil to be removed.

In November 1999, 10 borings were drilled in and around the MDDA excavation, and subsurface soil samples were collected from each boring. Fifty-one confirmatory samples were collected, generally at 10-foot intervals; however, additional samples were collected based on headspace readings and visual observations. Five or six samples from each boring also were sent to a local laboratory for 24-hour quick-turnaround analysis. The quick-turnaround sample results were used for making decisions about drilling additional borings. Three borings (SB-29-029, SB-29-030, and SB-29-035) were drilled inside the excavation, below the excavation floor, and seven borings were drilled outside the perimeter of the excavation. The total depth of the November 1999 borings extended to a minimum of 50 feet and a maximum of 75 feet BLS.

In January 2000, six new borings were drilled and two borings that had been completed in November 1999 (SB-29-034 and SB-29-036) were redrilled and resampled due to laboratory problems with the data. Seventy-five confirmatory samples were collected. Samples were collected in each boring at 5-foot intervals. Five or six samples from each of the new borings also were sent to a local laboratory for 24-hour quick-turnaround analysis. All of the borings completed in January 2000 extended to 50 feet BLS except for SB-29-044, which was 35 feet BLS. Six samples were collected at varying depths in six different borings for geotechnical analysis.

Based on the results of the Phase IIIB investigation at the AREE 29 MDDA, additional removal action activities were conducted at the MDDA. Visual, olfactory, and PID indications of soil contamination were used to help determine soil excavation limits. Removal actions at the MDDA were conducted in four separate phases. At the completion of the four phases, an estimated 4,470 yd^3 (5,370 tons) of hazardous soil, 58,992 yd^3 (70,710 tons) of non-hazardous soil, and 1,023,718 gallons of impacted precipitation were removed from the excavation and transported offsite. (Impacted groundwater/precipitation collected after May 4, 2000 is not included in this estimate.) Groundwater encountered in the excavation was pumped out of the excavation using vacuum trucks, and transported offsite to the approved disposal facility. Groundwater and collected precipitation were removed from the MDDA excavations and disposed of by General Oil Company (GOC) of Redford, Michigan; EQC; and Marine Pollution Control (MPC) of Detroit, Michigan.

Representative soil and water samples were collected for waste characterization analyses. Composite samples were collected from stockpiled and in-place materials. Samples were analyzed for flash point, corrosiveness (pH), reactive sulfide, reactive cyanide, total PCBs, TCLP volatiles, TCLP semivolatiles, TCLP metals, TCLP herbicides, and TCLP pesticides. Sample results indicated that batch treatment of the water as a non-hazardous waste was an appropriate disposal method. Sample results indicated that pretreatment for VOCs was necessary prior to landfilling for soil excavated during Phase I removal activities. Sample results indicated that landfilling, as a non-hazardous waste without pretreatment, was an appropriate disposal method for soils from the second, third, and fourth phases of the removal activities. Impacted soils were transported and disposed of by

EQC and MPC. Water transportation and disposal was conducted by GOC, EQC, and MPC. Waste characterization sampling and analyses were conducted directly by GOC, EQC, and MPC, as appropriate, for waste disposal purposes.

Thirty-one bottom and 26 sidewall samples were collected from the MDDA. In addition, one duplicate sample for every 10 confirmatory samples was collected, and one matrix spike/matrix spike duplicate (MS/MSD) for every 20 confirmatory samples were collected for quality control (QC) purposes. Samples were collected in March and April 2000 following the MDEQ guidelines for high- and low-level VOCs, metals, and PAHs soil sampling (EPA SW-846 Methods 5035/8260B, 3050B/6010B/7471, and 3540/8310).

All materials, debris, tools, and machinery were removed from the site upon completion of the work. The site was restored to existing conditions. The excavation was backfilled with clean imported clay fill and placed in 12 inch compacted lifts. Backfill activities began in July 2000 and were completed in September 2000. On October 2, 2000, a final site walk-through was conducted with U.S. Army personnel to confirm the acceptability of the final site conditions at the MDDA upon completion of backfill activities.

Confirmatory soil sample analytical results indicated the average concentrations of the COCs were below applicable cleanup criteria (PRGs). The analytical results also indicated the source of contamination has been removed. The removal actions conducted to date and the backfilling of the excavation adequately protect human health and the environment, in addition to adequately preparing the area for transfer and for future industrial and/or commercial land use as intended (SDAIC 2001).

Following excavation and backfilling at the MDDA, Phase IIIC operations were conducted. Three monitoring wells were installed around the former excavation, at depths of 87, 89, and 91 feet BLS. The wells were installed to ensure that MDDA contaminants had not migrated to the regional aquifer. The wells were developed following construction, and surveyed for elevation and location. The locations of the wells are presented in Figure 7. One well (MW-29-001) is upgradient of the MDDA, and two wells (MW-29-002 and MW-29-003) are downgradient from the backfilled excavation. The hydraulic gradient in the MDDA area from the upgradient well to the downgradient wells is very low (0.0001), with hydraulic head differences of 0.0871 to 0.0953 feet from MW-29-001 to MW-29-002 and MW-29-003, respectively. The well construction logs from Phase IIIC are included in Attachment C.

In October 2000, a groundwater sample was collected from each of the three wells, using a low-flow purging and sampling method. A duplicate sample also was collected from MW-29-001. Severn Trent Laboratories (STL) analyzed the samples for VOCs and total suspended solids (TSS). The methods and procedures for sampling and analysis are detailed in the Phase IIIC Addendum to the DCQAP (SAIC 2000). TCE was not detected in the groundwater samples. One VOC, toluene, was detected in MW-29-003 at 2.1 µg/L. This concentration is below all relevant groundwater criteria for residential and industrial land use. TSS results were below the detection limit in MW-29-001, 58 mg/L in MW-29-002, and 18 mg/L in MW-29-003. Acetone and methyl ethyl ketone (MEK) were detected at the reporting limit of 5 µg/L; however the data were rejected during validation. The rejected data were due to the relative response factors being less than 0.05, which resulted in the nondetected results potentially being biased low. Therefore the data was rejected in accordance with National Functional Guidelines. The concentrations of all detected constituents in the groundwater are presented in Attachment C. All concentrations are below relevant MDEQ drinking water criteria.

A program of quarterly sampling was conducted for 2 years (2001 and 2002) at the three MDDA wells to monitor the groundwater in the regional aquifer. Detections of Acetone, Carbon Disulfide, and Methylene Chloride above the reporting limits have not qualified as detections because of detections in the method blanks or trip blanks due to laboratory contamination. All detections have been well below the cleanup criteria. In January 2003, based on the results of the two years of quarterly sampling, MDEQ and the U.S. Army agreed to scale back the sampling to once annually

through the year 2005 (MDEQ 2003) (Attachment C). Results of the quarterly and annual monitoring are presented in Attachment C. If the sample results continue to indicate no impact to the groundwater, MDEQ will allow the sampling to be discontinued and the wells to be properly closed.

V. Progress Since the Last Review

This is the first Five-Year Review for the DATP.

VI. Five-Year Review Process

Administrative Components

In March 2004, Mr. Printes Parker, BRAC Environmental Coordinator at DATP, requested the assistance of the U.S. Army Corps of Engineers (USACE) in performing the first Five-Year Review of the subject project. Ms. Karen Rabek of USACE Louisville District in a phone conference with Mr. Gregory Mellema of USACE HTRW Center of Expertise and Todd Beckwith of the BRAC Office agreed to have USACE Louisville District conduct the Five-Year review. An agreement between Ms. Rabek and Mr. Parker established the following schedule:

Document Review	Mid Apr - Mid Aug
Data Review	Mid Apr - Mid Aug
Site Inspection	August 31, 2004
Five-Year Draft Report	September 30, 2004
Five-Year Final Report	October 31, 2004.

Community Involvement

Notification of the Five-Year Review was provided to the public via a newspaper ad in the Macomb Daily News on July 1, 2004.

Document Review

This first Five-Year Review consisted of a review of relevant documents including:

Closure Report Building T-12 (Montgomery Watson 1998)
Remaining Sites (AREE 2, 14, 22) Final Closure Report (Montgomery Watson September 1999)
Base Realignment and Closure (BRAC) Cleanup Plan (SAIC 1999)
Final Closure Report Oily Waste Disposal Area (Montgomery Watson 2000)
State-Wide Decision Document/Remedial Action Plan (SAIC 2001)
Final Closure Report Metal Debris Disposal Area (Montgomery Watson 2001)

Data Review

The following items included in Attachment C were reviewed:

Five Year Review Site Inspection Checklist
Content Checklist for Five Year Review Report
Groundwater Monitoring Data from Quarterly and Annual Monitoring of MDDA

Attachment C-1 lists the attendees of the 31 August 2004 site inspection. Attendees represented the Army, MDEQ and USACE.

Attachment C-2, the checklist for the 31 August 2004 site inspection was prepared by the DATP BEC, MDEQ, and USACE. There were no issues noted.

Attachment C-3 is the public notice that was published in the Macomb Daily News on July 1, 2004.

Attachment C-4, the Quarterly and Annual Groundwater Reports, indicates that the MDDA contamination has not impacted the groundwater.

Attachment C-5 is the 27 January 2003 letter from MDEQ to Printes Parker, agreeing to the annual as opposed to quarterly sampling.

Attachment C-6 consists of the MDDA monitoring well logs.

Attachment C-7 is the EPA Comprehensive Five-Year Review Guidance.

Attachment C-8 is the Content Checklist for Five-Year Review Reports.

Site Inspection

Inspection of the site was conducted on August 31, 2004 by representatives of the Michigan Department of Environmental Quality, U.S. Army Corps of Engineers, and the U.S. Army. The purpose of the inspection was to assess the protectiveness of the remedy. A complete list of inspection attendees is provided in Attachment C. The team met at MW29-001 of AREE 29 MDDA. The temperature was mid 70's with few clouds and low humidity.

Since the last groundwater monitoring in 2003, a new building, a warehouse under construction by Sky Development, Inc. has been erected in what had been the west infield of the test track. MW29-001 is right off the southwest corner of the parking lot for the new building. MW29-002 is by the parking lot next to the bocce ball courts for the UAW Region 1 Community and Retiree Center. MW29-003 is by the parking lot next to the concession stand and restrooms. The 2004 annual groundwater monitoring was conducted along with the 5-year review (see Photograph 1). See Figure 7 for the well locations at the time of development.

AREE 2 Building 4, the former Tank Plant building has been renovated and now houses three businesses, Noble Metal Processing, Inc., S.E.T. Steel, Inc., and USM Manufacturing Corporation. The removal of the chlorinated solvents in the soil occurred in the subsurface soil. After the removal

action, the floor was replaced (see Photograph 2 and Figure 3).

AREE 13 Building T-12 has been demolished and the Michigan Technical Education Center of the Macomb County Community College now stands at the site. The actual area of the removal action is the grass lawn next to Van Dyke Avenue (See Photograph 3 and Figure 3).

AREE 14 The Switch gear Housing site is paved over with parking lot (See Photograph 4 and Figure 3).

AREE 15 The Building 26 Fuel Station Pump House is no longer standing. The site is now paved over (See Photograph 5 and Figure 3).

AREE 22 The area where the ASTs had been removed at the Central heating Plant is now a grassy area beside the road (See Photograph 6 and Figure 3).

AREE 29 The Metal Debris Disposal Area (MDDA) is now covered by paved parking lot for the UAW Region 1 Office Community and Retiree Center (See Photographs 7 and 8). The building has no basement as agreed to with the deed restrictions prohibiting digging. Quarterly and annual monitoring has indicated that groundwater has not been impacted by the TCE contamination from the MDDA. The area that had been the location of the Oily Waste Disposal Area (OWDA) is also covered by a paved parking lot (See Photograph 9). See Figure 3 for AREE 29 location.

Site Inspection Summary

The removal actions have all been successful. The property was transferred to the City of Warren and several new businesses and a community college have been built. New roads have been built to access the new building and parking lots have been paved. There is no evidence of any contamination left at any of the sites. The City of Warren has zoning laws in effect that would prevent the area from becoming a residential area and the deed restrictions prevent any further digging.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents ?

Yes, the removal actions have all been successful. The quarterly and annual groundwater monitoring has indicated that the groundwater has not been impacted by the contamination that was present at the MDDA. The quarterly monitoring as of January 27, 2003 (see form 5, Attachment C) has been reduced to annual monitoring which has lowered the annual costs.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid ?

Yes, the remedial action objectives are still valid. Road construction and construction of buildings and parking lots has occurred. City of Warren zoning laws and deed restrictions preventing digging ensure that human health and the environment remains protected.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy ?

No, the remedies are working as intended.

Technical Assessment Summary

The remedial actions have achieved the remedial objectives of preventing the leaching of TCE into the groundwater and preventing TCE and Vinyl Chloride from contaminating the air. MDEQ has agreed that the sampling can be discontinued and the wells can be closed if the 2005 annual groundwater sampling shows that the groundwater has not been impacted.

VIII. Issues

No issues were found that affect the protectiveness of the remedies.

IX. Recommendations and Follow-up Actions

The recommendation is to maintain already programmed groundwater monitoring activities. If the 2005 annual monitoring shows that the groundwater has not been impacted, the wells can be closed and sampling discontinued with MDEQ approval.

X. Protectiveness Statement

The remedy at the Detroit Arsenal Tank Plant is protective of human health and the environment, because the remedial actions at all OUs are protective.

XI. Next Review

The next report will be due 02 October 2010.

XII. References

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Attachment A Figures

Figure 1 General Location Map
Figure 2 Site Map
Figure 3 Locations of RI AREEs
Figure 4 Soil Volatilization to Indoor Air Inhalation Criteria (SVCIIC) for TCE
Figure 5 Soil Volatilization to Indoor Air Inhalation Criteria (SVCIIC) for Vinyl Chloride
Figure 6 Time to Reach Target TCE Concentration in Soil at 75 ft. BLS
Figure 7 MDDA Monitoring Well Locations

Attachment B Photographs

Photograph 1	**AREE 29** - Long-term monitoring at the former Metal Debris Disposal Area, MW29-003.
Photograph 2	**AREE 2** - Inside what had been Building 4 where soil contaminated with chlorinated solvents had been removed from below the floor.
Photograph 3	**AREE 13** - Printes Parker and Karen Rabek standing beside the Macomb County Community College along Van Dyke Road at the site of the former Building T-12.
Photograph 4	**AREE 14** - Printes Parker standing at location of the former Switchgear Housing site.
Photograph 5	**AREE 15** - Printes Parker standing at the former location of the Building 26 Fuel Station Pump House.
Photograph 6	**AREE 22** - Printes Parker standing where the Central Heating Plant ASTs had been located.
Photograph 7	**AREE 29** - Printes Parker standing over what had been the Metal Debris Area site.
Photograph 8	**AREE 29** - Former Metal Debris Area site.
.Photograph 9	**AREE 29** - Printes Parker standing at what had been the Oily Waste Disposal Area.

Attachment C Forms

1 5-Year Review Site Inspection Attendees
2 5-Year Review Site Inspection Checklist
3 Public Notice
4 Groundwater Monitoring Data
5 MDEQ Letter
6 Monitoring Well Logs
7 Content Checklist for Five-Year Review Reports

A Figures

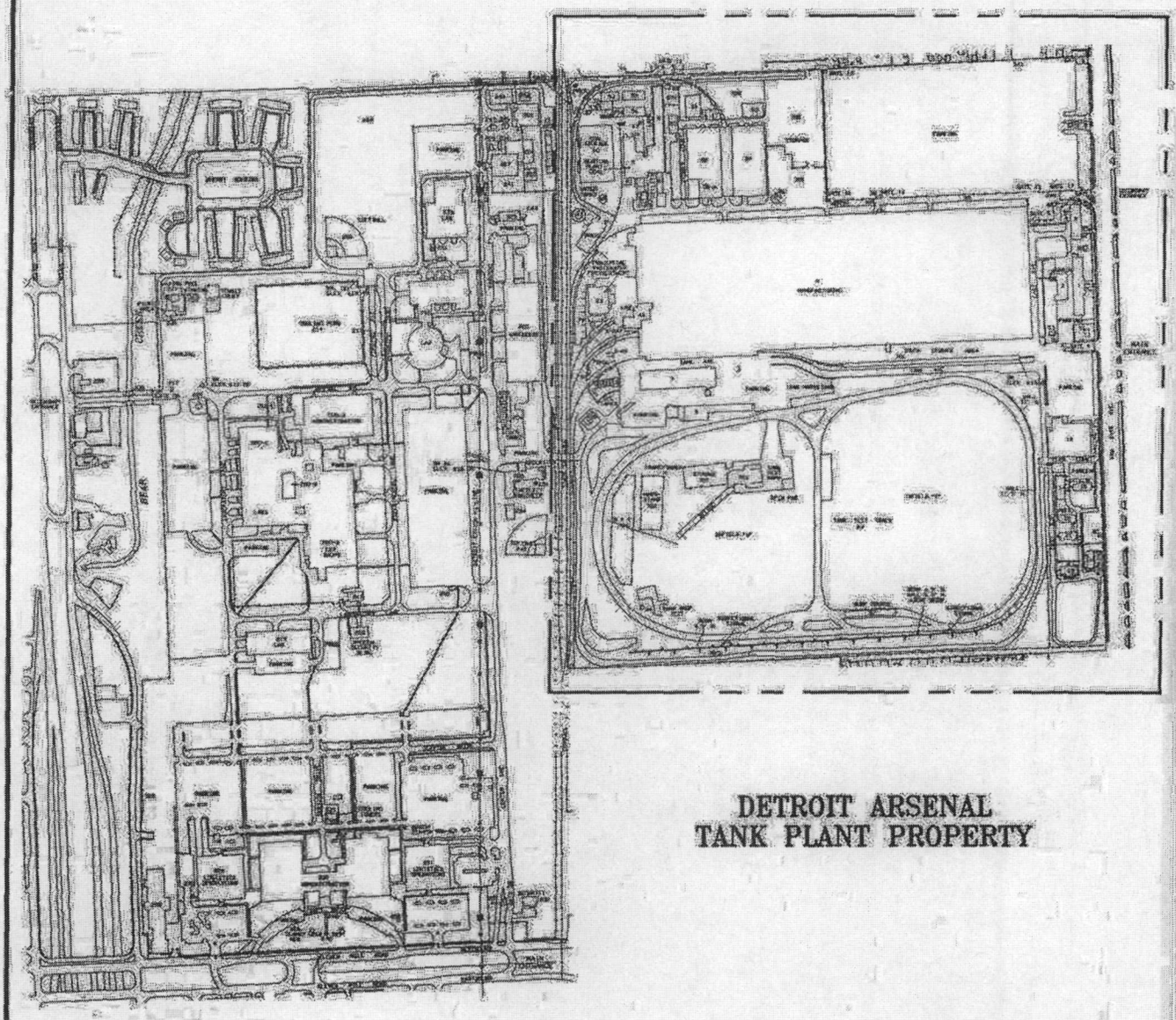
Detroit Arsenal Tank Plant
5-Year Review

SOURCE: AMERICAN AUTOMOBILE ASSOCIATION 1995

N

Figure 1

GENERAL LOCATION MAP
DETROIT ARSENAL TANK PLANT
WARREN, MICHIGAN



DETROIT ARSENAL
TANK PLANT PROPERTY

ARSENAL PROPERTY

LEGEND:

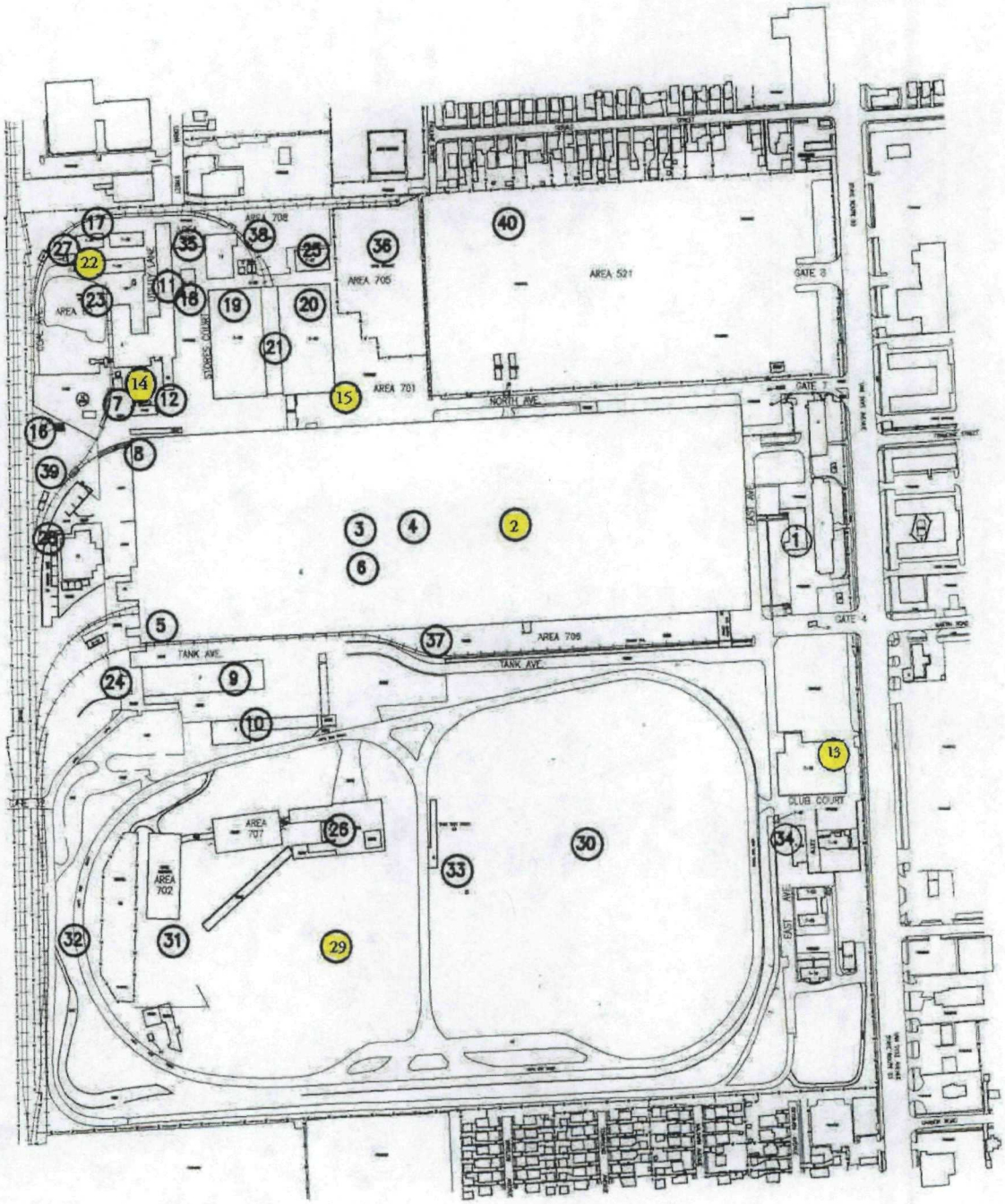
- BUILDING
- FENCE LINE
- PRIMARY ROADS
- RAILROAD TRACK

N

NOT TO SCALE

Figure 2

SITE MAP
DETROIT ARSENAL TANK PLANT
WARREN, MICHIGAN



LEGEND:

- BUILDING
- FENCE LINE
- PRIMARY ROADS
- RAILROAD TRACK
- (1) AREE NO.

N

0 250 500 1000

SCALE: 1" = 500'

Figure 3

LOCATION OF RI AREEs

DETROIT ARSENAL TANK PLANT
WARREN, MICHIGAN

Figure 4 . Soil Volatilization to Indoor Air Inhalation Criteria (SVIIC) for TCE Infinite Source for Clay Loam Soil

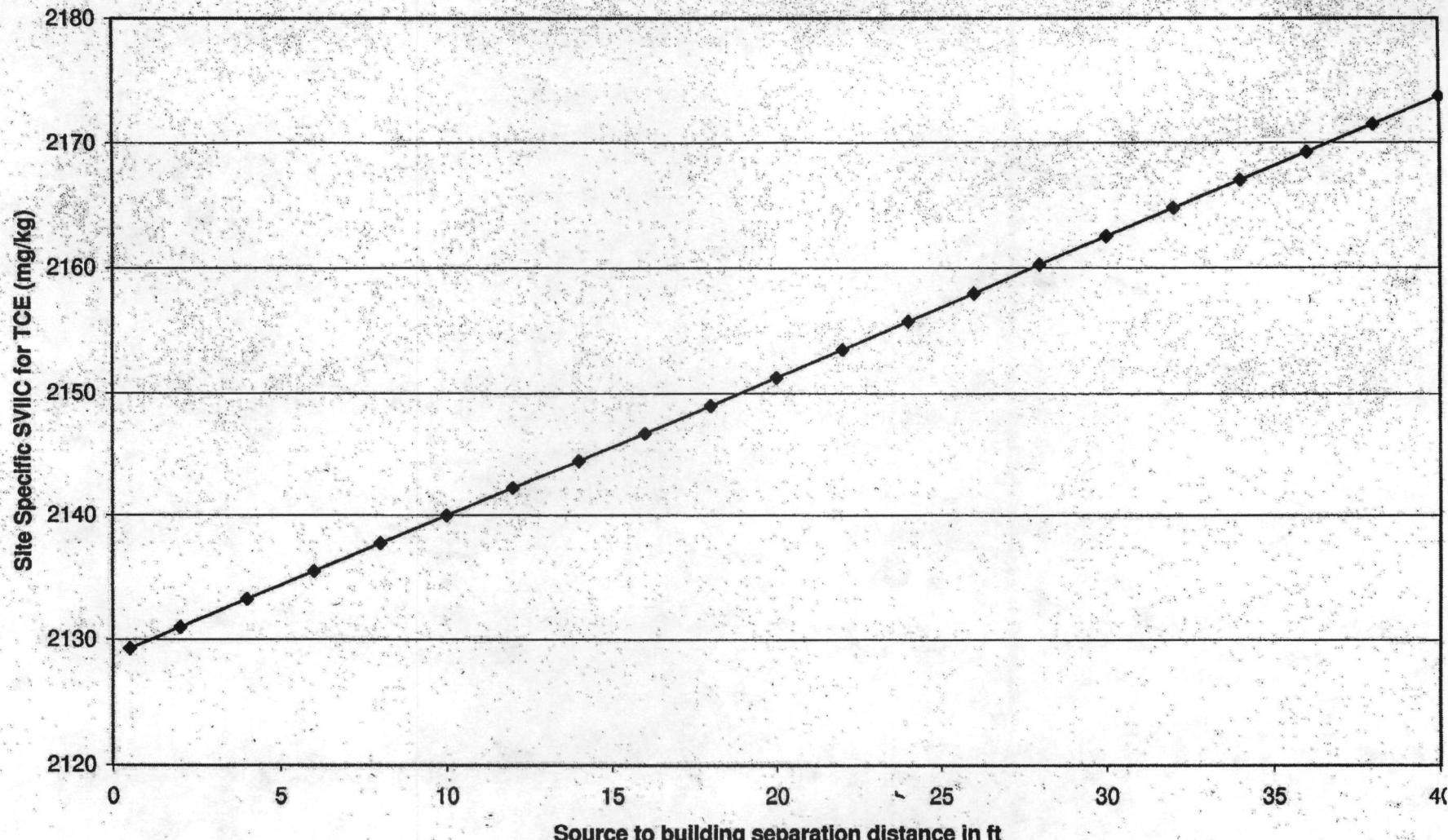


Figure 5 - Soil Volatilization to Indoor Air Inhalation Criteria (SVIIC) for Vinyl Chloride Infinite Source for Clay Loam Soil

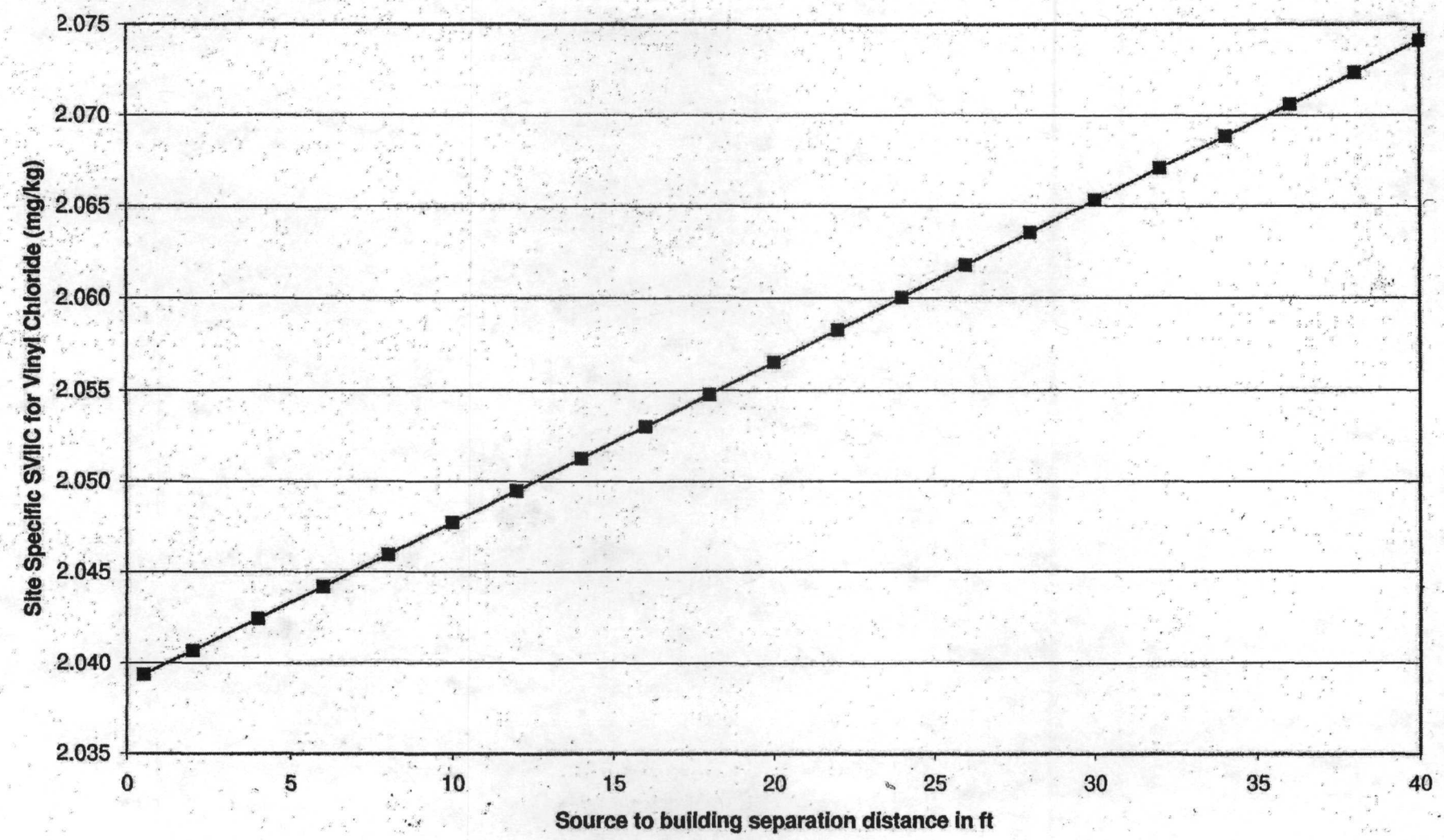
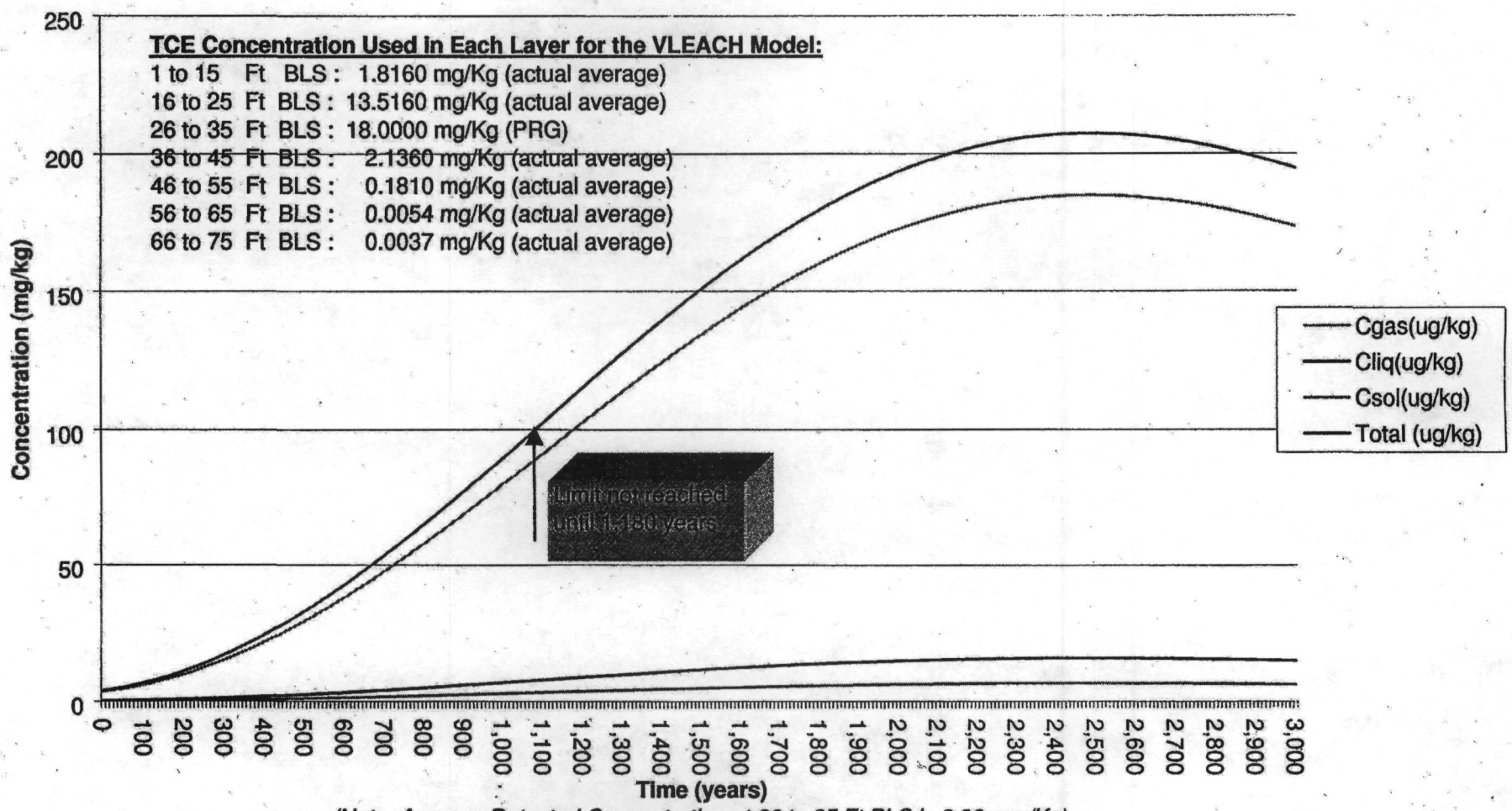
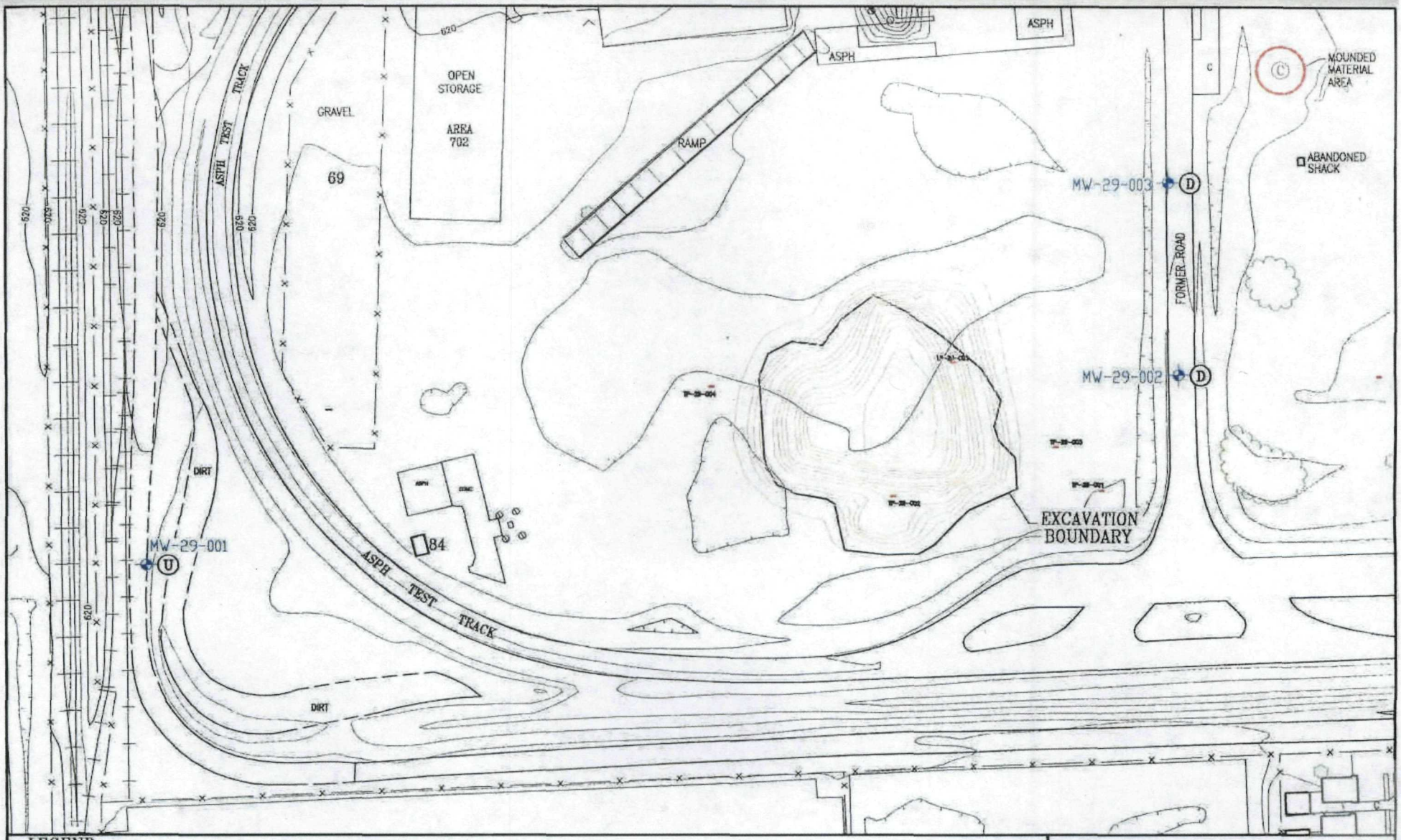


Figure 6 Time to Reach Target TCE Concentration in Soil at 75 ft BLS
AREE 29 METAL DEBRIS DISPOSAL AREA
DETROIT ARSENAL TANK PLANT, WARREN, MICHIGAN



(Note: Average Detected Concentration at 26 to 35 Ft BLS is 2.93 mg/Kg)



LEGEND:

- BUILDING
- ROADS
- TOPOGRAPHIC CONTOUR (CI = 2ft)
- (U) UPGRADIENT WELL LOCATION
- (D) DOWNGRADIENT WELL LOCATION
- PHASE I TEST PIT

N

0 50 100 150

SCALE: 1" = 150'

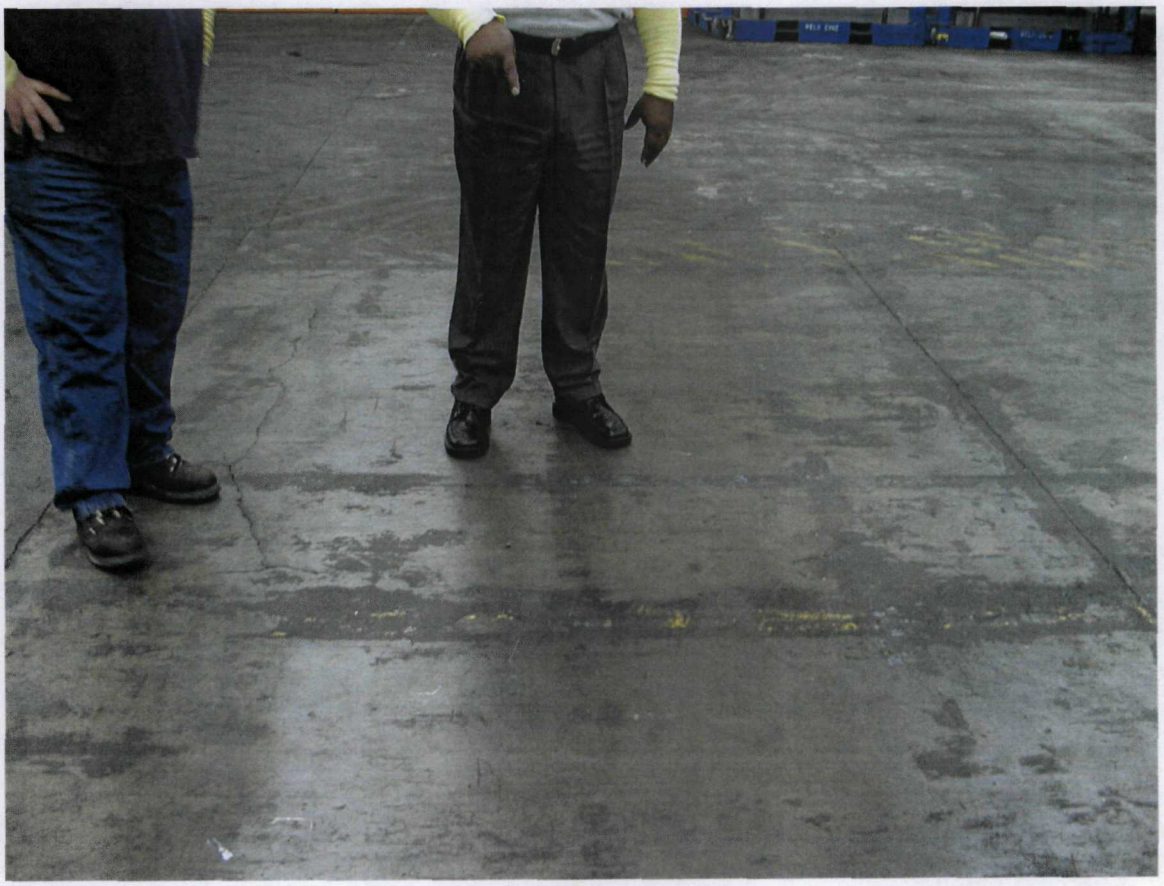
Figure 7

MDDA
PHASE IIIC MONITORING WELL LOCATIONS
DETROIT ARSENAL TANK PLANT
WARREN, MICHIGAN

B Photographs

Detroit Arsenal Tank Plant
5-Year Review

Photograph 1 AREE 29 - Long-term monitoring at the former Metal Debris Disposal Area, MW29-003.



Photograph 2 AREE 2 - Inside what had been Building 4 where soil contaminated with chlorinated solvents had been removed from below the floor.

Photograph 3 AREE 13 - Printes Parker and Karen Rabek standing beside the Macomb County Community College along Van Dyke Road at the site of the former Building T-12. Photo taken looking south.

Photograph 4 AREE 14 - Printes Parker standing at location of the former Switchgear Housing site. Photo taken looking northeast.

Photograph 5 AREE 15 - Printes Parker standing at the former location of the Building 26 Fuel Station Pump House. Photo taken looking south towards Building 4.

Photograph 6 AREE 22 - Printes Parker standing where the Central Heating Plant ASTs had been located. Photo taken looking northwest.

Photograph 7 AREE 29 - Printes Parker standing over what had been the Metal Debris Area site. Photo taken looking northeast.

Photograph 8 AREE 29 - Former Metal Debris Area site. Photo taken looking northeast.

Photograph 9 AREE 29 - Printes Parker standing at what had been the Oily Waste Disposal Area. Photo taken looking north.

C FORMS

Detroit Arsenal Tank Plant
5-Year Review

Detroit Arsenal Tank Plant

Five Year Review

Site Inspection Attendees August 31, 2004

Name	Organization	Telephone	E-mail
Karen Rabek	Corps of Engineers	(502) 315-6328	Karen.V.Rabek@LRL02.usace.army.mil
Jordan Clark	Corps of Engineers	(502) 315-6335	Tenkai.K.Chavasika@LRL02.usace.army.mil
Josh Nickel	Corps of Engineers	502-315-6315	Joshua.Nickel@LRL02.usace.army.mil
Printes Parker	US Army Garrison-DET	586-574-5124	printes.parker@us.army.mil
Paul Gauthier	Mich. DEQ	517-373-9892	gauthiep@michigan.gov

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Detroit Arsenal Tank Plant	**Date of inspection:** 31 August 2004
Location and Region: Warren, MI	**EPA ID:** MI5210022781 **MDEQ ID:** Site DATP95-42
Agency, office, or company leading the five-year review: USACE, Louisville District	**Weather/temperature:** Clear, Sunny, Mild temperatures, 60's to 70's

Remedy Includes: (Check all that apply)

- _ Landfill cover/containment
- _ Access controls
- ✓ Institutional controls
- _ Groundwater pump and treatment
- _ Surface water collection and treatment
- ✓ Monitored natural attenuation
- _ Groundwater containment
- _ Vertical barrier walls
- ✓ Other Mr. Parker pointed out that all the LTM samples have been clean and plans are to close the wells in 2005. Natural attenuation may not be correct term.

Attachments: ✓ Inspection team roster attached _ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Printes Parker (Name) BEC (Title) 31 August 2004 (Date)
   Interviewed ✓ at site _ at office _ by phone Phone no. (586) 574-5124
   Problems, suggestions; _ Report attached _____

2. **O&M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed _ at site _ at office _ by phone Phone no. _____
   Problems, suggestions; _ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency MDEQ
Contact Paul Gauthier — Env. Quality Specialist — 5/3/04 — (517) 373-7892
Name — Title — Date — Phone no.
Problems; suggestions; _ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name — Title — Date — Phone no.
Problems; suggestions; _ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name — Title — Date — Phone no.
Problems; suggestions; _ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name — Title — Date — Phone no.
Problems; suggestions; _ Report attached _____

4. **Other interviews** (optional) _ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   _ O&M manual _ Readily available _ Up to date _ N/A
   _ As-built drawings _ Readily available _ Up to date _ N/A
   _ Maintenance logs _ Readily available _ Up to date _ N/A
   Remarks_____

2. **Site-Specific Health and Safety Plan** _ Readily available _ Up to date _ N/A
   _ Contingency plan/emergency response plan _ Readily available _ Up to date _ N/A
   Remarks_____

3. **O&M and OSHA Training Records** _ Readily available _ Up to date _ N/A
   Remarks_____

4. **Permits and Service Agreements**
   _ Air discharge permit _ Readily available _ Up to date _ N/A
   _ Effluent discharge _ Readily available _ Up to date _ N/A
   _ Waste disposal, POTW _ Readily available _ Up to date _ N/A
   _ Other permits_____ _ Readily available _ Up to date _ N/A
   Remarks_____

5. **Gas Generation Records** _ Readily available _ Up to date _ N/A
   Remarks_____

6. **Settlement Monument Records** _ Readily available _ Up to date _ N/A
   Remarks_____

7. **Groundwater Monitoring Records** √ Readily available _ Up to date _ N/A
   Remarks Groundwater Monitoring Reports available upon request. October 2000 through November 2003.

8. **Leachate Extraction Records** _ Readily available _ Up to date _ N/A
   Remarks_____

9. **Discharge Compliance Records**
   _ Air _ Readily available _ Up to date _ N/A
   _ Water (effluent) _ Readily available _ Up to date _ N/A
   Remarks_____

10. **Daily Access/Security Logs** _ Readily available _ Up to date _ N/A
    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

_ State in-house _ Contractor for State
_ PRP in-house _ Contractor for PRP
_ Federal Facility in-house _ Contractor for Federal Facility
_ Other_____

2. **O&M Cost Records**

_ Readily available _ Up to date
_ Funding mechanism/agreement in place
Original O&M cost estimate_____ _ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ _ Breakdown attached
Date Date Total cost
From_____ To_____ _____ _ Breakdown attached
Date Date Total cost
From_____ To_____ _____ _ Breakdown attached
Date Date Total cost
From_____ To_____ _____ _ Breakdown attached
Date Date Total cost
From_____ To_____ _____ _ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ✓ Applicable _ N/A

A. Fencing

1. **Fencing damaged** _ Location shown on site map _ Gates secured ✓ N/A

Remarks_____

B. Other Access Restrictions

1. **Signs and other security measures** _ Location shown on site map _ N/A

Remarks Deed Restrictions - City of Warren Zoning
No digging. No use of groundwater

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented _ Yes ✓ No _ N/A
Site conditions imply ICs not being fully enforced _ Yes ✓ No _ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

Reporting is up-to-date _ Yes _ No _ N/A
Reports are verified by the lead agency _ Yes _ No _ N/A

Specific requirements in deed or decision documents have been met _ Yes _ No _ N/A
Violations have been reported _ Yes _ No _ N/A
Other problems or suggestions: _ Report attached

2. **Adequacy** ✓ ICs are adequate _ ICs are inadequate _ N/A
Remarks _____

D. General

1. **Vandalism/trespassing** _ Location shown on site map ✓ No vandalism evident
Remarks _____

2. **Land use changes on site** _ N/A
Remarks Zoned industrial - Property transferred to City of Warren
New roads, buildings, parking lots

3. **Land use changes off site** ✓ N/A
Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads ✓ Applicable _ N/A

1. **Roads damaged** _ Location shown on site map ✓ Roads adequate _ N/A
Remarks _____

B. Other Site Conditions

Remarks _____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS _ Applicable ✓ N/A

A. Landfill Surface

1. **Settlement** (Low spots) _ Location shown on site map _ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** _ Location shown on site map _ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** _ Location shown on site map _ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** _ Location shown on site map _ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** _ Grass _ Cover properly established _ No signs of stress
   _ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** _ N/A
   Remarks_____
   _____

7. **Bulges** _ Location shown on site map _ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** _ Wet areas/water damage not evident
_ Wet areas _ Location shown on site map Areal extent_____
_ Ponding _ Location shown on site map Areal extent_____
_ Seeps _ Location shown on site map Areal extent_____
_ Soft subgrade _ Location shown on site map Areal extent_____
Remarks_____
_____

9. **Slope Instability** _ Slides _ Location shown on site map _ No evidence of slope instability
Areal extent_____
Remarks_____
_____

B. Benches _ Applicable _ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** _ Location shown on site map _ N/A or okay
Remarks_____
_____

2. **Bench Breached** _ Location shown on site map _ N/A or okay
Remarks_____
_____

3. **Bench Overtopped** _ Location shown on site map _ N/A or okay
Remarks_____
_____

C. Letdown Channels _ Applicable _ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** _ Location shown on site map _ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____
_____

2. **Material Degradation** _ Location shown on site map _ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____
_____

3. **Erosion** _ Location shown on site map _ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____
_____

4. **Undercutting** _ *Location shown on site map* _ *No evidence of undercutting*
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ _ No obstructions
_ Location shown on site map Areal extent_____
Size_____
Remarks_____

6. ***Excessive Vegetative Growth*** Type_____
_ No evidence of excessive growth
_ Vegetation in channels does not obstruct flow
_ Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations _ Applicable _ N/A

1. **Gas Vents** _ Active _ Passive
_ Properly secured/locked _ Functioning _ Routinely sampled _ Good condition
_ *Evidence of leakage at penetration* _ Needs Maintenance
_ N/A
Remarks_____

2. **Gas Monitoring Probes**
_ Properly secured/locked _ Functioning _ Routinely sampled _ Good condition
_ Evidence of leakage at penetration _ Needs Maintenance _ N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
_ Properly secured/locked _ Functioning _ Routinely sampled _ Good condition
_ Evidence of leakage at penetration _ Needs Maintenance _ N/A
Remarks_____

4. **Leachate Extraction Wells**
_ Properly secured/locked _ Functioning _ Routinely sampled _ Good condition
_ Evidence of leakage at penetration _ Needs Maintenance _ N/A
Remarks_____

5. **Settlement Monuments** _ Located _ Routinely surveyed _ N/A
Remarks_____

E. Gas Collection and Treatment _ Applicable _ N/A

1. **Gas Treatment Facilities**
   _ Flaring _ Thermal destruction _ Collection for reuse
   _ Good condition _ Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   _ Good condition _ Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   _ Good condition _ Needs Maintenance _ N/A
   Remarks_____

F. Cover Drainage Layer _ Applicable _ N/A

1. **Outlet Pipes Inspected** _ Functioning _ N/A
   Remarks_____

2. **Outlet Rock Inspected** _ Functioning _ N/A
   Remarks_____

G. Detention/Sedimentation Ponds _ Applicable _ N/A

1. **Siltation** Areal extent_____ Depth_____ _ N/A
   _ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   _ Erosion not evident
   Remarks_____

3. **Outlet Works** _ Functioning _ N/A
   Remarks_____

4. **Dam** _ Functioning _ N/A
   Remarks_____

H. Retaining Walls _ Applicable _ N/A

1. **Deformations** _ Location shown on site map _ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** _ Location shown on site map _ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge _ Applicable _ N/A

1. **Siltation** _ Location shown on site map _ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** _ Location shown on site map _ N/A
   _ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** _ Location shown on site map _ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** _ Functioning _ N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS _ Applicable ✓N/A

1. **Settlement** _ Location shown on site map _ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   _ Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ✓Applicable _N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ✓Applicable _N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

✓Good condition _All required wells located _Needs O&M _N/A

Remarks_____

_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

✓Good condition _ Needs O&M

Remarks_____

3. **Spare Parts and Equipment**

✓Readily available _Good condition _Requires upgrade _Needs to be provided

B. Surface Water Collection Structures, Pumps, and Pipelines _Applicable ✓N/A

1. **Collection Structures, Pumps and Electrical**

_Good condition _Needs O&M

Remarks _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

_Good condition _Needs O&M

Remarks_____

3. **Spare Parts and Equipment**

_Readily available _Good condition _Requires upgrade _Needs to be provided

Remarks_____

C. Treatment System _ Applicable ✓N/A

1. **Treatment Train** (Check components that apply)

_ Metals removal _ Oil/water separation _ Bioremediation
_ Air stripping _ Carbon adsorbers
_ Filters_____
_ Additive (*e.g., chelation agent, flocculent*)_____
_ Others_____
_ Good condition _ Needs Maintenance
_ Sampling ports properly marked and functional
_ Sampling/maintenance log displayed and up to date
_ Equipment properly identified
_ Quantity of groundwater treated annually_____
_ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

_ N/A _ Good condition _ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**
_ N/A _ Good condition _ Proper secondary containment _ Needs Maintenance
Remarks_____

4. **Discharge Structure and Appurtenances**
_ N/A _ Good condition _ Needs Maintenance
Remarks_____

5. **Treatment Building(s)**
_ N/A _ Good condition (esp. roof and doorways) _ Needs repair
_ Chemicals and equipment properly stored
Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
_ Properly secured/locked _ Functioning _ Routinely sampled _ Good condition
_ All required wells located _ Needs Maintenance _ N/A
Remarks_____

D. Monitoring Data

1. Monitoring Data
√ Is routinely submitted on time √ Is of acceptable quality

2. Monitoring data suggests: No contamination
_ Groundwater plume is effectively contained _ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
√ Properly secured/locked √ Functioning √ Routinely sampled √ Good condition
√ All required wells located _ Needs Maintenance _ N/A
Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and as emission, etc.).

Groundwater has been monitored quarterly from October 2000 through October 2002. Annual monitoring began in 2003.

The 2004 annual monitoring was done during the August 31 site visit.

The data through 2003 has been analyzed and validated.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Current remedies protective of both human health and the environment

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

N/A

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. If water samples continue to be clean, the wells can be closed.

Public Notice of Five-Year Review
Detroit Army Tank Plant
Macomb County, Michigan

The U.S. Army, in conjunction with the Michigan Department of Environmental Quality (MDEQ) is conducting a five-year review of the Detroit Army Tank Plant (DATP) site. The site includes the Metal Debris Disposal Area (MDDA). The DATP site closed under the provisions of the Base Realignment and Closure Act of 1995. Soil and shallow groundwater contamination was present in the MDDA. Soil Removal and Backfill activities were complete in October 2002 and long-term groundwater monitoring of the MDDA began in January 2000. It is expected that a draft copy of the Five-Year Review Report will be available for public review and comment in mid-May 2005. For more information contact:

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DATP – Metal Debris Disposal Area
4th Quarter 2000
Collection Date – October 11, 2000

Analyte	Reporting Limits	MW29-001	Duplicate 001	MW29-002	MW29-003
Volatile Organics	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1,1-Trichloroethane	1	1U	1U	1U	1U
1,1,2,2-Tetrachloroethane	1	1U	1U	1U	1U
1,1,2-Trichloroethane	1	1U	1U	1U	1U
1,1-Dichloroethane	1	1U	1U	1U	1U
1,1-Dichloroethene	1	1U	1U	1U	1U
1,2-Dichloroethane	1	1U	1U	1U	1U
1,2-Dichloroethene, total	1	1U	1U	1U	1U
1,2-Dichloropropane	10	1U	1U	1U	1U
2-Hexanone	5	5U	5U	5U	5U
Acetone	5	**5R**	**5R**	**5R**	**5R**
Benzene	1	1U	1U	1U	1U
Bromodichloromethane	1	1U	1U	1U	1U
Bromoform	10	1U	1U	1U	1U
Bromomethane	1	1U	1U	1U	1U
Carbon Disulfide	5	1U	1U	1U	1U
Carbon Tetrachloride	1	1U	1U	1U	1U
Chlorobenzene	1	1U	1U	1U	1U
Chloroethane	1	1U	1U	1U	1U
Chloroform	1	1U	1U	1U	1U
Chloromethane	1	1U	1U	1U	1U
Dibromochloromethane	1	1U	1U	1U	1U
Ethylbenzene	1	1U	1U	1U	1U
Methylene Chloride	1	2U	2U	2U	2U
Methylethylketone	5	**5R**	**5R**	**5R**	**5R**
Methylisobutylketone	5	1U	1U	1U	1U
Styrene	1	1U	1U	1U	1U
Tetrachloroethene	1	1U	1U	1U	1U
Toluene	1	1U	1U	1U	**2.1**
Trichloroethene	1	1U	1U	1U	1U
Vinyl chloride	1	1U	1U	1U	1U
Xylenes, total	1	1U	1U	1U	1U
cis-1,3-Dichloropropene	1	1U	1U	1U	1U
trans-1,3-Dichloropropene	1	1U	1U	1U	1U

U - Analyte was analyzed for, but not detected.

R - Value is rejected due to the relative response factors being less than 0.05.

DATP – Metal Debris Disposal Area
1st Quarter 2001
Collection Date – February 1, 2001

Analyte	Reporting Limits	MW29-001	MW29-002	Field Dup	MW29-003
Volatile Organics	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1,1-Trichloroethane	5	U	U	U	U
1,1,2,2-Tetrachloroethane	5	U	U	U	U
1,1,2-Trichloroethane	5	U	U	U	U
1,1-Dichloroethane	5	U	U	U	U
1,1-Dichloroethene	5	U	U	U	U
1,2-Dichloroethane	5	U	U	U	U
1,2-Dichloroethene, total	5	U	U	U	U
1,2-Dichloropropane	5	U	U	U	U
2-Butanone	10	U	U	U	**4.24 J**
2-Hexanone	10	U	U	U	U
4-Methyl-2-Pentanone	10	U	U	U	U
Acetone	5	U	U	**9.57**	**20.5**
Benzene	5	U	U	U	U
Bromodichloromethane	5	U	U	U	U
Bromoform	5	U	U	U	U
Bromomethane	10	U	U	U	U
Carbon Disulfide	5	U	U	U	U
Carbon Tetrachloride	5	U	U	U	U
Chlorobenzene	5	U	U	U	U
Chloroethane	10	U	U	U	U
Chloroform	5	U	U	U	U
Chloromethane	10	U	U	U	U
Dibromochloromethane	5	U	U	U	U
Ethylbenzene	5	U	U	U	U
Methylene Chloride	5	**4.22 J,BU**	**3.58 J,BU**	**4.21 J,BU**	**4.04 J,BU**
Styrene	5	U	U	U	U
Tetrachloroethene	5	U	U	U	U
Toluene	5	U	U	U	**3.14 J**
Trichloroethene	5	U	U	U	U
Vinyl Chloride	10	U	U	U	U
cis-1,2-Dichloroethene	5	U	U	U	U
cis-1,3-Dichloropropene	5	U	U	U	U
m,p-Xylenes	5	U	U	U	**2.64 J**
o-Xylenes	5	U	U	U	**1.47 J**
trans-1,2-Dichloroethene	5	U	U	U	U
trans-1,3-Dichloropropene	5	U	U	U	U

BU - Qualified as undetected because of laboratory contamination.
U - Analyte was analyzed for, but not detected.
J - Estimated data detected below Reporting Limits.
Field Dupilicate taken at MW29-002.

DATP – Metal Debris Disposal Area
2nd Quarter 2001
Collection Date – June 6, 2001

Analyte	Reporting Limits	MW29-001	MW29-002	Field Dup	MW29-003
Volatile Organics	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1,1-Trichloroethane	5	U	U	U	U
1,1,2,2-Tetrachloroethane	5	U	U	U	U
1,1,2-Trichloroethane	5	U	U	U	U
1,1-Dichloroethane	5	U	U	U	U
1,1-Dichloroethene	5	U	U	U	U
1,2-Dichloroethane	5	U	U	U	U
1,2-Dichloroethene, total	5	U	U	U	U
1,2-Dichloropropane	5	U	U	U	U
2-Butanone	10	U	U	U	U
2-Hexanone	10	U	U	U	U
4-Methyl-2-Pentanone	10	U	U	U	U
Acetone	5	**9.24 J, BU**	U	U	U
Benzene	5	U	U	U	U
Bromodichloromethane	5	U	U	U	U
Bromoform	5	U	U	U	U
Bromomethane	10	U	U	U	U
Carbon Disulfide	5	U	U	U	U
Carbon Tetrachloride	5	U	U	U	U
Chlorobenzene	5	U	U	**4.76 J,BU**	U
Chloroethane	10	U	U	U	U
Chloroform	5	U	U	U	U
Chloromethane	10	U	U	U	U
Dibromochloromethane	5	U	U	U	U
Ethylbenzene	5	U	U	U	U
Methylene Chloride	5	**7.97 J, BU**	**8.63 J, BU**	**9.16 J, BU**	**8.27 J, BU**
Styrene	5	U	U	U	U
Tetrachloroethene	5	U	U	U	U
Toluene	5	U	U	U	U
Trichloroethene	5	U	U	U	U
Vinyl Chloride	10	U	U	U	U
cis-1,2-Dichloroethene	5	U	U	U	U
cis-1,3-Dichloropropene	5	U	U	U	U
m,p-Xylenes	5	U	U	U	U
o-Xylenes	5	U	U	U	U
trans-1,2-Dichloroethene	5	U	U	U	U
trans-1,3-Dichloropropene	5	U	U	U	U

BU- Qualified as undetected because of laboratory contamination.
J - Estimated data detected below Reporting Limits.
Field Duplicate taken at MW29-002.

DATP – Metal Debris Disposal Area
3rd Quarter 2001
Collection Date – August 21 and 22, 2001

Analyte	Reporting Limits	MW29-001	MW29-002	Field Dup	MW29-003
Volatile Organics	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1,1-Trichloroethane	5	U	U	U	U
1,1,2,2-Tetrachloroethane	5	U	U	U	U
1,1,2-Trichloroethane	5	U	U	U	U
1,1-Dichloroethane	5	U	U	U	U
1,1-Dichloroethene	5	U	U	U	U
1,2-Dichloroethane	5	U	U	U	U
1,2-Dichloroethene, total	5	U	U	U	U
1,2-Dichloropropane	5	U	U	U	U
2-Butanone	10	U	U	U	U
2-Hexanone	10	U	U	U	U
4-Methyl-2-Pentanone	10	U	U	U	U
Acetone	5	U	U	U	U
Benzene	5	U	U	U	U
Bromodichloromethane	5	U	U	U	U
Bromoform	5	U	U	U	U
Bromomethane	10	U	U	U	U
Carbon Disulfide	5	U	U	U	U
Carbon Tetrachloride	5	U	U	U	U
Chlorobenzene	5	U	U	U	U
Chloroethane	10	U	U	U	U
Chloroform	5	U	U	U	U
Chloromethane	10	U	U	U	U
Dibromochloromethane	5	U	U	U	U
Ethylbenzene	5	U	U	U	U
Methylene Chloride	5	**4.76 J, BU**	**4.62 J, BU**	**4.54 J, BU**	**5.01 J, BU**
Styrene	5	U	U	U	U
Tetrachloroethene	5	U	U	U	U
Toluene	5	U	U	U	U
Trichloroethene	5	U	U	U	U
Vinyl Chloride	10	U	U	U	U
cis-1,2-Dichloroethene	5	U	U	U	U
cis-1,3-Dichloropropene	5	U	U	U	U
m,p-Xylenes	5	U	U	U	U
o-Xylenes	5	U	U	U	U
trans-1,2-Dichloroethene	5	U	U	U	U
trans-1,3-Dichloropropene	5	U	U	U	U

BU- Qualified as undetected because of laboratory contamination
J - Estimated data detected below Reporting Limits
Field Duplicate taken at MW29-002.

DATP – Metal Debris Disposal Area
4th Quarter 2001
Collection Date – November 2, 2001

Analyte	Reporting Limits	MW29-001	MW29-002	Field Dup	MW29-003
Volatile Organics	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1,1-Trichloroethane	5	U	U	U	U
1,1,2,2-Tetrachloroethane	5	U	U	U	U
1,1,2-Trichloroethane	5	U	U	U	U
1,1-Dichloroethane	5	U	U	U	U
1,1-Dichloroethene	5	U	U	U	U
1,2-Dichloroethane	5	U	U	U	U
1,2-Dichloroethene, total	5	U	U	U	U
1,2-Dichloropropane	5	U	U	U	U
2-Butanone	10	U	U	U	U
2-Hexanone	10	U	U	U	U
4-Methyl-2-Pentanone	10	U	U	U	U
Acetone	5	U	U	U	U
Benzene	5	U	U	U	U
Bromodichloromethane	5	U	U	U	U
Bromoform	5	U	U	U	U
Bromomethane	10	U	U	U	U
Carbon Disulfide	5	U	U	U	U
Carbon Tetrachloride	5	U	U	U	U
Chlorobenzene	5	U	U	U	U
Chloroethane	10	U	U	U	U
Chloroform	5	U	U	U	U
Chloromethane	10	U	U	U	U
Dibromochloromethane	5	U	U	U	U
Ethylbenzene	5	U	U	U	U
Methylene Chloride	5	**5.09 J, BU**	**38.3 UBS**	**38.9 UBS**	**50.0 UBS**
Styrene	5	U	U	U	U
Tetrachloroethene	5	U	U	U	U
Toluene	5	U	U	U	U
Trichloroethene	5	U	U	U	U
Vinyl Chloride	10	U	U	U	U
cis-1,2-Dichloroethene	5	U	U	U	U
cis-1,3-Dichloropropene	5	U	U	U	U
m,p-Xylenes	5	U	U	U	U
o-Xylenes	5	U	U	U	U
trans-1,2-Dichloroethene	5	U	U	U	U
trans-1,3-Dichloropropene	5	U	U	U	U

BU - Qualified as undetected because of laboratory contamination.
J - Estimated data detected below Reporting Limits.
UBS - Qualified as undetected because of laboratory blank and sampling blanks contamination.
Field Dupilicate taken at MW29-002.

DATP – Metal Debris Disposal Area
1st Quarter 2002
Collection Date – February 20, 2002

Analyte	Reporting Limits	MW29-001	MW29-002	MW29-003	Field Dup
Volatile Organics	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1,1-Trichloroethane	5	NS	U	U	U
1,1,2,2-Tetrachloroethane	5	NS	U	U	U
1,1,2-Trichloroethane	5	NS	U	U	U
1,1-Dichloroethane	5	NS	U	U	U
1,1-Dichloroethene	5	NS	U	U	U
1,2-Dichloroethane	5	NS	U	U	U
1,2-Dichloroethene, total	5	NS	U	U	U
1,2-Dichloropropane	5	NS	U	U	U
2-Butanone	10	NS	U	U	U
2-Hexanone	10	NS	U	U	U
4-Methyl-2-Pentanone	10	NS	U	U	U
Acetone	10	NS	U	**10.4 UBS**	**9.76 J,UBBS**
Benzene	5	NS	U	U	U
Bromodichloromethane	5	NS	U	U	U
Bromoform	5	NS	U	U	U
Bromomethane	10	NS	U	U	U
Carbon Disulfide	5	NS	**3.01 J**	**7.00**	U
Carbon Tetrachloride	5	NS	U	U	U
Chlorobenzene	5	NS	U	U	U
Chloroethane	10	NS	U	U	U
Chloroform	5	NS	U	U	U
Chloromethane	10	NS	U	U	U
Dibromochloromethane	5	NS	U	U	U
Ethylbenzene	5	NS	U	U	U
Methylene Chloride	5	NS	U	U	U
Styrene	5	NS	U	U	U
Tetrachloroethene	5	NS	**2.00 J**	U	U
Toluene	5	NS	U	U	U
Trichloroethene	5	NS	U	U	U
Vinyl Chloride	10	NS	U	U	U
cis-1,2-Dichloroethene	5	NS	U	U	U
cis-1,3-Dichloropropene	5	NS	U	U	U
m,p-Xylenes	5	NS	U	U	U
o-Xylenes	5	NS	U	U	U
trans-1,2-Dichloroethene	5	NS	U	U	U
trans-1,3-Dichloropropene	5	NS	U	U	U

UBS - Qualified as undetected because of laboratory blank/sampling blank contamination.
U - Analyte was analyzed for, but not detected.
J - Estimated data detected below Reporting Limits and or internal QC failure.
NS - Not Sampled
Field Duplicate taken at MW29-003.

DATP – Metal Debris Disposal Area
2nd Quarter 2002
Collection Date – May 8, 2002

Analyte	Reporting Limits	MW29-001	MW29-002	MW29-003	Field Dup
Volatile Organics	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1,1-Trichloroethane	5	U	U	U	U
1,1,2,2-Tetrachloroethane	5	U	U	U	U
1,1,2-Trichloroethane	5	U	U	U	U
1,1-Dichloroethane	5	U	U	U	U
1,1-Dichloroethene	5	U	U	U	U
1,2-Dichloroethane	5	U	U	U	U
1,2-Dichloroethene, total	5	U	U	U	U
1,2-Dichloropropane	5	U	U	U	U
2-Butanone	10	U	U	U	U
2-Hexanone	10	U	U	U	U
4-Methyl-2-Pentanone	10	U	U	U	U
Acetone	10	U	U	**9.6 J**	**9.2 J**
Benzene	5	U	U	U	U
Bromodichloromethane	5	U	U	U	U
Bromoform	5	U	U	U	U
Bromomethane	10	U	U	U	U
Carbon Disulfide	5	**5.7**	U	U	U
Carbon Tetrachloride	5	U	U	U	U
Chlorobenzene	5	U	U	U	U
Chloroethane	10	U	U	U	U
Chloroform	5	U	U	U	U
Chloromethane	10	U	U	U	U
Dibromochloromethane	5	U	U	U	U
Ethylbenzene	5	U	U	U	U
Methylene Chloride	5	**4.2 JB**	**4.1 JB**	**4.5 JB**	**4.5 JB**
Styrene	5	U	U	U	U
Tetrachloroethene	5	U	U	U	U
Toluene	5	U	U	U	U
Trichloroethene	5	U	U	U	U
Vinyl Chloride	10	U	U	U	U
cis-1,2-Dichloroethene	5	U	U	U	U
cis-1,3-Dichloropropene	5	U	U	U	U
m,p-Xylenes	5	U	U	U	U
o-Xylenes	5	U	U	U	U
trans-1,2-Dichloroethene	5	U	U	U	U
trans-1,3-Dichloropropene	5	U	U	U	U

B - Found in the Method Blank as well as the associated samples for organics.
U - Analyte was analyzed for, but not detected.
J - Estimated data detected below Reporting Limits and or one or more internal QC failure.
Field Duplicate taken at MW29-002.

DATP – Metal Debris Disposal Area
3rd Quarter 2002
Collection Date – August 20, 2001

Analyte	Reporting Limits	MW29-001	MW29-002	MW29-003	Field Dup
Volatile Organics	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1,1-Trichloroethane	5	U	U	U	U
1,1,2,2-Tetrachloroethane	5	U	U	U	U
1,1,2-Trichloroethane	5	U	U	U	U
1,1-Dichloroethane	5	U	U	U	U
1,1-Dichloroethene	5	U	U	U	U
1,2-Dichloroethane	5	U	U	U	U
1,2-Dichloroethene, total	5	U	U	U	U
1,2-Dichloropropane	5	U	U	U	U
2-Butanone	10	U	U	U	U
2-Hexanone	10	U	U	U	U
4-Methyl-2-Pentanone	10	U	U	U	U
Acetone	10	U	U	U	U
Benzene	5	U	U	U	U
Bromodichloromethane	5	U	U	U	U
Bromoform	5	U	U	U	U
Bromomethane	10	U	U	U	U
Carbon Disulfide	5	**4.8 J**	U	U	U
Carbon Tetrachloride	5	U	U	U	U
Chlorobenzene	5	U	U	U	U
Chloroethane	10	U	U	U	U
Chloroform	5	U	U	U	U
Chloromethane	10	U	U	U	U
Dibromochloromethane	5	U	U	U	U
Ethylbenzene	5	U	U	U	U
Methylene Chloride	5	**6.1 B**	**6.0 B**	**5.7 B**	**6.2 B**
Styrene	5	U	U	U	U
Tetrachloroethene	5	**1.1 JB**	**1.7 JB**	**1.8 JB**	**1.7 JB**
Toluene	5	**1.0 J**	U	U	U
Trichloroethene	5	**2.2 JB**	U	U	U
Vinyl Chloride	10	U	U	U	U
cis-1,2-Dichloroethene	5	U	U	U	U
cis-1,3-Dichloropropene	5	U	U	U	U
m,p-Xylenes	5	U	U	U	U
o-Xylenes	5	U	U	U	U
trans-1,2-Dichloroethene	5	U	U	U	U
trans-1,3-Dichloropropene	5	U	U	U	U

B - Found in the Method Blank as well as the associated samples for organics.
U - Analyte was analyzed for, but not detected.
J - Estimated data detected below Reporting Limits and or one or more internal QC failure.
Field Duplicate taken at MW29-003.

DATP – Metal Debris Disposal Area
4th Quarter 2002
Collection Date – November 2, 2002

Analyte	Reporting Limits	MW29-001	MW29-002	MW29-003	Field Dup
Volatile Organics	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1,1-Trichloroethane	5	U	U	U	U
1,1,2,2-Tetrachloroethane	5	U	U	U	U
1,1,2-Trichloroethane	5	U	U	U	U
1,1-Dichloroethane	5	U	U	U	U
1,1-Dichloroethene	5	U	U	U	U
1,2-Dichloroethane	5	U	U	U	U
1,2-Dichloroethene, total	5	U	U	U	U
1,2-Dichloropropane	5	U	U	U	U
2-Butanone	10	U	U	U	U
2-Hexanone	10	U	U	U	U
4-Methyl-2-Pentanone	10	U	U	U	U
Acetone	10	U	U	U	U
Benzene	5	U	U	U	U
Bromodichloromethane	5	U	U	U	U
Bromoform	5	U	U	U	U
Bromomethane	10	U	U	U	U
Carbon Disulfide	5	U	U	U	U
Carbon Tetrachloride	5	U	U	U	U
Chlorobenzene	5	U	U	U	U
Chloroethane	10	U	U	U	U
Chloroform	5	U	U	U	U
Chloromethane	10	U	U	U	U
Dibromochloromethane	5	U	U	U	U
Ethylbenzene	5	U	U	U	U
Methylene Chloride	5	**30 BS**	**28 BS**	**25 BS**	**27 BS**
Styrene	5	U	U	U	U
Tetrachloroethene	5	U	U	U	U
Toluene	5	U	U	U	U
Trichloroethene	5	U	U	U	U
Vinyl Chloride	10	U	U	U	U
cis-1,2-Dichloroethene	5	U	U	U	U
cis-1,3-Dichloropropene	5	U	U	U	U
m,p-Xylenes	5	U	U	U	U
o-Xylenes	5	U	U	U	U
trans-1,2-Dichloroethene	5	U	U	U	U
trans-1,3-Dichloropropene	5	U	U	U	U

BS - Estimated data because of laboratory blank and sampling blank contamination.
U - Analyte was analyzed for, but not detected.
Field Duplicate taken at MW29-003.

DATP – Metal Debris Disposal Area
Annual 2003
Collection Date – November 13, 2003

Analyte	Reporting Limits	MW29-001	MW29-002	MW29-003	Field Dup
Volatile Organics	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1,1-Trichloroethane	5	U	U	U	U
1,1,2,2-Tetrachloroethane	5	U	U	U	U
1,1,2-Trichloroethane	5	U	U	U	U
1,1-Dichloroethane	5	U	U	U	U
1,1-Dichloroethene	5	U	U	U	U
1,2-Dichloroethane	5	U	U	U	U
1,2-Dichloroethene, total	5	U	U	U	U
1,2-Dichloropropane	5	U	U	U	U
2-Butanone	10	**4 JB**	U	U	**8.9 JB**
2-Hexanone	10	U	U	U	U
4-Methyl-2-Pentanone	10	U	U	U	U
Acetone	10	**11 B**	**9.8 JB**	**11 B**	U
Benzene	5	U	U	U	U
Bromodichloromethane	5	U	U	U	U
Bromoform	5	U	U	U	U
Bromomethane	10	U	U	U	U
Carbon Disulfide	5	U	U	U	U
Carbon Tetrachloride	5	U	U	U	U
Chlorobenzene	5	U	U	U	U
Chloroethane	10	U	U	U	U
Chloroform	5	U	U	U	U
Chloromethane	10	U	U	U	U
Dibromochloromethane	5	U	U	U	U
Ethylbenzene	5	U	U	U	U
Methylene Chloride	5	U	**3.9 JB**	**3.7 JB**	**4.9 JB**
Styrene	5	U	U	U	U
Tetrachloroethene	5	U	U	U	U
Toluene	5	U	U	U	U
Trichloroethene	5	U	U	U	U
Vinyl Chloride	10	U	U	U	U
cis-1,2-Dichloroethene	5	U	U	U	U
cis-1,3-Dichloropropene	5	U	U	U	U
m,p-Xylenes	5	U	U	U	U
o-Xylenes	5	U	U	U	U
trans-1,2-Dichloroethene	5	U	U	U	U
trans-1,3-Dichloropropene	5	U	U	U	U

B - Indicates that the analyte was found in the associated blank as well as the sample.
J - Value is less than the reporting limits, but greater than the Minimum Detection Limits.
U - Analyte was analyzed for, but not detected.
Field Duplicate taken at MW29-002.

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

ENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

January 27, 2003

Mr. Printes Parker
USA TACOM
MS 117
AMSTA-CM-XEV
Warren, Michigan 48397-5000

Dear Printes,

As we discussed during our phone conversation on January 24, 2003, the Michigan Department of Environmental Quality (MDEQ) agrees to let the Army scale back sampling the Metal Debris Disposal Area (MDDA) monitoring wells from four times annually to once annually. This decision is base upon the previous two years (nine sampling events) of quarterly sampling. Sample analysis from all the sampling events does not indicate that the MDDA has had an impact on the deep aquifer in that area. The Army agrees to continue sampling the wells annually starting in September 2003 and continuing until September 2005. If the sample results continue to indicate no impact after the 2005 sampling, MDEQ will allow the sampling to be discontinued and the wells properly closed.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Paul Gauthier

Paul A.Gauthier
Program Information, Funding and
Support Services Unit
Program Support Section
Remediation and Redevelopment Division
517-373-9892

cc: Ms. Karen Rabek, USA COE

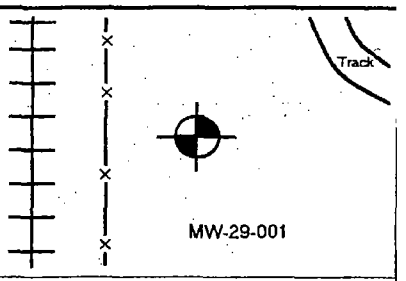
Well Construction Log MW-29-001

(Page 1 of 3)

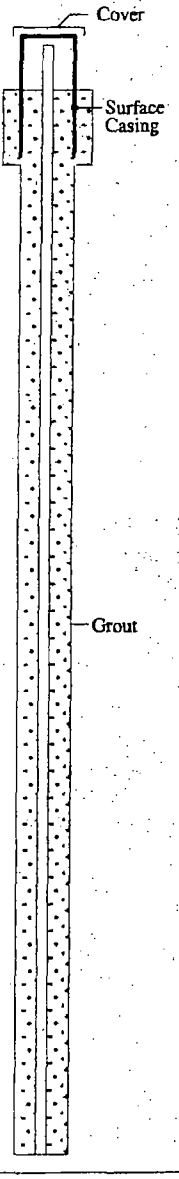
United States Army Corps of Engineers
Detroit Arsenal Tank Plant
Detroit, Michigan

Contract Number DACA31-94-D0066
Delivery Order 0007

Date	: 9/14/00-9/15/00
Drilling Method	: Sonic Drill Rig
Geologist	: M. Staines, SAIC
Driller	: S. Johnson, BLA
Helper	: K. Tautkus, SAIC
Ground Cover	: Bare
Water Level	: 79'
Total Boring Depth	: 95'
Borehole Diameter	: 8"
X, Y Coordinates	: 13481862.7145, 365781.996



Depth in ft.	DESCRIPTION	USCS	GRAPHIC	PID (ppm)
0–2	GRAVELLY SAND, 7.5YR3/2 dark brown, loose, wet, gravel up to 1" in diameter, fill.	SW / SC		0
2–4	CLAYEY SAND with GRAVEL, 7.5YR2.5/1 black, stiff, fill.	GP		
4–6	GRAVEL with SAND, 7.5YR3/1 very dark gray, subangular, loose, wet, gravel up to 1.5" in diameter, fill.	SM		0
6–8	SILTY SAND with GRAVEL, stiff, not plastic, damp, trace clay, fine-grained gravel up to 0.5" in diameter.	CL		
8–10	CLAY with SILT and GRAVEL, mottled 10YR4/4 dark yellowish brown, 10YR4/6 dark yellowish brown, and 10YR5/1 gray, very plastic, very stiff, damp, trace sand and cobbles, fine-grained gravel is matrix-supported, weathered.			0
10–12				
12–14	CLAY, 7.5YR5/1 gray, stiff, plastic, well sorted, with some fine, subround to subangular gravel and silt, iron oxide mottling , espically at 11-12.5'.	CL		
14–16				0
16–18	SILTY CLAY, 10YR4/1 dark gray, very stiff, plastic, damp, with matrix-supported pebbles up to 0.5", not weathered or disturbed, with slight variations in silt/clay ratios, plasticity, and moisture.	CL		
18–20				
20–22	CLAY with SILT, till, contains matrix-supported coarse-grained sand and fine pebbles up to 0.5", very stiff, plastic, damp.	CL		2.9
22–24				
24–26				1.4
26–28				
28–30				
30–32		CL		0



Well Construction Information

GROUT/BACKFILL

Type	: Portland cement/bentonite
Setting	: 0-67'
Proportions	: 50 lbs cement/ 2.5 lbs ben.
Tremmied (y/n)	: y

SEAL

Type	: Volclay/Pure Gold ben.
Setting	: 67-72'
Composition	: 3/8" bentonite pellets
Set-up time	: 14 hours
Tremmied (y/n)	: n

SCREEN

Type	: Global Drilling PVC
Inside Diameter	: 4"
Slot Size	: 0.010"
Setting	: 77-87'

RISER

Type	: PVC
Inside Diameter	: 4"
Schedule	: 40
Setting	: 0-77'
Stickup	: 2.8'

FILTER PACK

Type	: Best Sand Corp. quartz sand
Setting	: 72-87'
Amount used	: 350 lbs.
Tremmied (y/n)	: n

CENTRALIZERS

Type	: Stainless steel
Depth	: 20' and 67'

SURFACE COMPLETION

PROTECTIVE CASING:
- Type: Steel
- Length: 5'
- Diameter: 8"
- Setting: 3' AGS to 2' BGS
- Drain Hole: Yes

SURFACE PAD:
- Dimensions (LWH): 3' x 3' x 0.5'
- Material: Concrete

PROTECTIVE POSTS:
- Configuration: 4 @ corners of pad
- Type: Steel filled with concrete

Notes:
Map file name:
Total Well Depth: 87'

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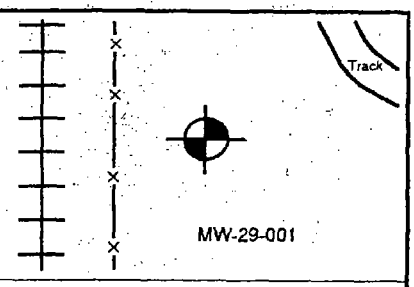
Well Construction Log MW-29-001

(Page 2 of 3)

United States Army Corps of Engineers
Detroit Arsenal Tank Plant
Detroit, Michigan

Contract Number DACA31-94-D0066
Delivery Order 0007

Date	: 9/14/00-9/15/00
Drilling Method	: Sonic Drill Rig
Geologist	: M. Staines, SAIC
Driller	: S. Johnson, BLA
Helper	: K. Tautkus, SAIC
Ground Cover	: Bare
Water Level	: 79'
Total Boring Depth	: 95'
Borehole Diameter	: 8"
X, Y Coordinates	: 13481862.7145, 365781.996



Well: MW-29-001
Elev.: 619.516

Depth in ft.	DESCRIPTION	USCS	GRAPHIC	PID (ppm)
32	SILTY CLAY, 10YR4/1 very dark gray, firm, slightly moist, very plastic, with trace matrix-supported fine pebbles and coarse sand, 30% silt.	CL		0.7
38	CLAY with SILT, 10YR4/1 very dark gray, soft, very plastic, very moist, 15% silt and no pebbles.	CH		0
46	CLAY with SILT, very plastic, soft, very moist, 20% silt and 1% matrix-supported pebbles to 1", with a few spots that are pure clay, very plastic, very stiff, moist. No pebbles, wet at 50'.	CH		0
50	CLAY, very plastic, soft, no pebbles, with trace silt and large chunks of 100% clay, very plastic, very firm, moist.	CH		0
54	CLAY, 75% of interval is very plastic, very stiff, damp, 25% of intercal is clay with trace silt, moist, soft, very plastic.	CH		0
56	CLAY, 10YR4/1 very dark gray, very plastic, firm, moist, with 1% matrix-supported pebbles and coarse sand, 2.5" cobble at 55' and other well rounded pebbles up to .25".	CH		
60	CLAY with SILT, 10YR4/1 very dark gray, very plastic, firm, slightly moist, 15-20% silt and 1% matrix-supported pebbles to 1".	CL		0
62	SILTY CLAY, 10YR4/1 very dark gray, with seams of non-plastic silt, 30% silt.	CL		
64		SC		

Well Construction Information

GROUT/BACKFILL

Type	: Portland cement/bentonite
Setting	: 0-67'
Proportions	: 50 lbs cement/ 2.5 lbs ben.
Tremmied (y/n)	: y

SEAL

Type	: Volclay/Pure Gold ben.
Setting	: 67-72'
Composition	: 3/8" bentonite pellets
Set-up time	: 14 hours
Tremmied (y/n)	: n

SCREEN

Type	: Global Drilling PVC
Inside Diameter	: 4"
Slot Size	: 0.010"
Setting	: 77-87'

RISER

Type	: PVC
Inside Diameter	: 4"
Schedule	: 40
Setting	: 0-77'
Stickup	: 2.8'

FILTER PACK

Type	: Best Sand Corp. quartz sand
Setting	: 72-87'
Amount used	: 350 lbs.
Tremmied (y/n)	: n

CENTRALIZERS

Type	: Stainless steel
Depth	: 20' and 67'

SURFACE COMPLETION

PROTECTIVE CASING:
Type: Steel
Length: 5'
Diameter: 8"
Setting: 3"AGS to 2' BGS
Drain Hole: Yes

SURFACE PAD:
Dimensions (LWH): 3' x 3' x 0.5'
Material: Concrete

PROTECTIVE POSTS:
Configuration: 4 @ corners of pad
Type: Steel filled with concrete

Notes:
Map file name:
Total Well Depth: 87'

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Well Construction Log MW-29-001

(Page 3 of 3)

United States Army Corps of Engineers
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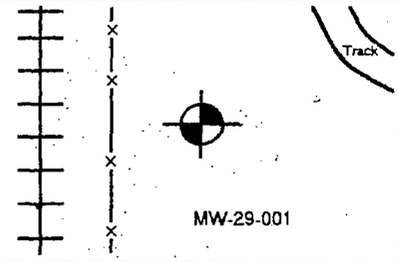
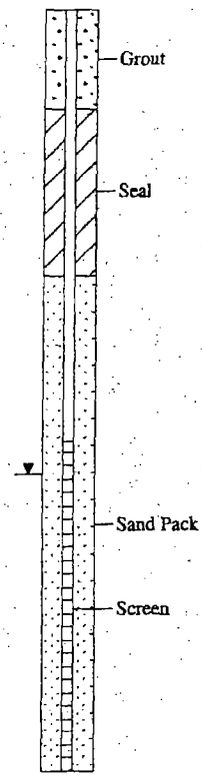


Well: MW-29-001
Elev.: 619.516

Depth in ft.	DESCRIPTION	USCS	GRAPHIC	PID (ppm)
64	CLAYEY SAND, not plastic, hard, fine-grained sand with trace medium-grained, dry (slightly damp in spots), 30% clay, 7% pebbles up to 1".	SC		1.5
66	SAND, 10YR4/1 very dark gray, fine-grained, loose, very moist, 1% pebbles, 3" cobbles found at 66'.	SP		0
68				
70				
72	CLAYEY SAND, very hard, dry, 3% pebbles.	SC		
74	Same as 66-72', no cobbles, very moist to wet.	SP		0
76	SANDY CLAY, not plastic, hard, damp, fine-grained sand.	SC		
78	SAND with CLAY, 10YR4/1 very dark gray, fine-grained, loose, moist, not plastic, 15% clay.	SC		
80	SILT, 10YR4/1 very dark gray, not plastic, stiff, damp, trace (15%) clay.	ML		
82	SAND, multi-colored (green, yellow, white, brown, black, tan), fine- to coarse-grained, loose, saturated, with pebbles and cobbles up to 3".	SP		0
84	SAND, 10YR4/1 very dark gray, fine- to medium-grained, soft, loose, saturated, trace clay pieces.	SP		0
86	SAND, 10YR4/1 very dark gray, very fine-grained, loose, wet, soft.	SP		
88	SAND and SILT, 10YR4/1 very dark gray, very fine-grained sand, soft, loose, wet, 50/50 sand and silt. Natural cave-in.	ML		0
90				
92	SILT with SAND, 10YR4/1 very dark gray, very fine-grained sand (trace sand), loose, wet. Natural cave-in.	ML		0
94				
96				



Well Construction Information

GROUT/BACKFILL

Type	: Portland cement/bentonite
Setting	: 0-67'
Proportions	: 50 lbs cement/ 2.5 lbs ben.
Tremmied (y/n)	: y

SEAL

Type	: Volclay/Pure Gold ben.
Setting	: 67-72'
Composition	: 3/8" bentonite pellets
Set-up time	: 14 hours
Tremmied (y/n)	: n

SCREEN

Type	: Global Drilling PVC
Inside Diameter	: 4"
Slot Size	: 0.010"
Setting	: 77-87'

RISER

Type	: PVC
Inside Diameter	: 4"
Schedule	: 40
Setting	: 0-77'
Stickup	: 2.8'

FILTER PACK

Type	: Best Sand Corp. quartz sand
Setting	: 72-87'
Amount used	: 350 lbs.
Tremmied (y/n)	: n

CENTRALIZERS

Type	: Stainless steel
Depth	: 20' and 67'

SURFACE COMPLETION

PROTECTIVE CASING:
- Type: Steel
- Length: 5'
- Diameter: 8"
- Setting: 3' AGS to 2' BGS
- Drain Hole: Yes

SURFACE PAD:
- Dimensions (LWH): 3' x 3' x 0.5'
- Material: Concrete

PROTECTIVE POSTS:
- Configuration: 4 @ corners of pad
- Type: Steel filled with concrete

Notes:
Map file name:
Total Well Depth: 87'

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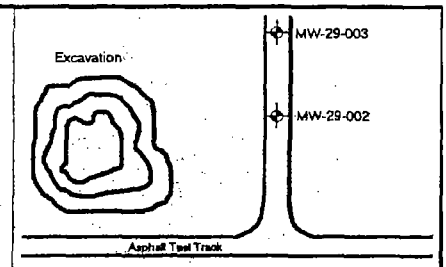
Well Construction Log MW-29-002

(Page 1 of 3)

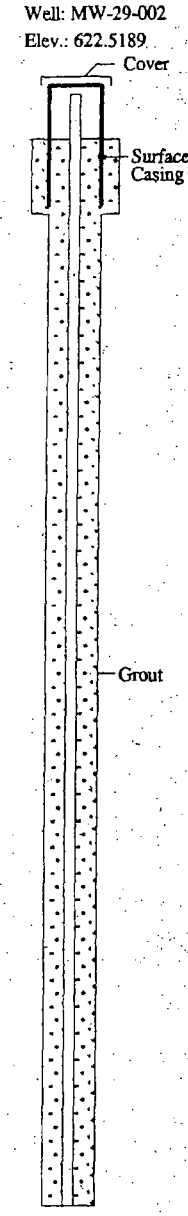
United States Army Corps of Engineers
Detroit Arsenal Tank Plant
Detroit, Michigan

Contract Number DACA31-94-D0066
Delivery Order 0007

Date	: 9/16/00-9/17/00
Drilling Method	: Sonic Drill Rig
Geologist	: K. Tautkus, SAIC
Driller	: S. Johnson, BLA
Helper	: M. Staines, SAIC
Ground Cover	: Bare
Water Level	: 78'
Total Boring Depth	: 95'
Borehole Diameter	: 8"
X, Y Coordinates	: 13482976.768, 365990.1939



Depth in ft.	DESCRIPTION	USCS	GRAPHIC	PID (ppm)
0	SANDY GRAVEL, 10YR4/3 brown, poorly sorted, subrounded-subangular, fine- to coarse-grained gravel, loose, damp, with fine- to coarse-grained sand.	GP		0
2				
	GRAVELLY SAND, 5YR4/3 reddish brown, poorly sorted, angular-subrounded, fine- to coarse-grained sand, loose, damp, with fine- to coarse-grained gravel, gravel grades into sand with depth.	GP		
4				
6		SC		0
	SANDY CLAY, 10YR5/1 gray, well sorted, stiff, slightly plastic, damp, with some fine-grained sand and nodules of pure clay.	CL		
8				
10	SILTY CLAY, 10YR6/2 light brownish gray, very stiff, slightly plastic, weathered.			0
12	SILTY CLAY with GRAVEL, 10YR5/4 yellowish brown, very stiff, slightly plastic, with angular-subrounded, very fine- to coarse-grained gravel, weathered.	CL		
14				0
16	SILTY CLAY, 10YR4/1 dark gray, very stiff, slightly plastic, damp, with trace medium-to coarse-grained sand and subangular-subrounded, fine- to coarse-grained gravel, becomes very sandy at bottom 0.5' (unweathered native till).			
18				
20				0
22		CL		
24	Very slightly plastic, wet at 30'.			0
26				
28				
30				0
32		CH		



Well Construction Information

GROUT/BACKFILL

Type	: Portland cement/bentonite
Setting	: 0-69'
Proportions	: 50 lbs cement/ 2.5 lbs ben.
Tremmied (y/n)	: y

SEAL

Type	: Volclay/Pure Gold ben.
Setting	: 69-74'
Composition	: 3/8" bentonite pellets
Set-up time	: 15 hours
Tremmied (y/n)	: n

SCREEN

Type	: Global Drilling PVC
Inside Diameter	: 4"
Slot Size	: 0.010"
Setting	: 79-89'

RISER

Type	: PVC
Inside Diameter	: 4"
Schedule	: 40
Setting	: 0-79'
Stickup	: 2.8'

FILTER PACK

Type	: Best Sand Corp. quartz sand
Setting	: 74-89'
Amount used	: 350 lbs.
Tremmied (y/n)	: n

CENTRALIZERS

Type	: Stainless steel
Depth	: 20' and 69'

SURFACE COMPLETION

PROTECTIVE CASING:
- Type: Steel
- Length: 5'
- Diameter: 8"
- Setting: 3' AGS to 2' BGS
- Drain Hole: Yes

SURFACE PAD:
- Dimensions (LWH): 3' x 3' x 0.5'
- Material: Concrete

PROTECTIVE POSTS:
- Configuration: 4 @ corners of pad
- Type: Steel filled with concrete

Notes: Geotech sample collected from 90-93'.
Map file name:
Total Well Depth: 89'

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Well Construction Log MW-29-002

(Page 2 of 3)

United States Army Corps of Engineers
Detroit Arsenal Tank Plant
Detroit, Michigan

Contract Number DACA31-94-D0066
Delivery Order 0007

Date	: 9/16/00-9/17/00
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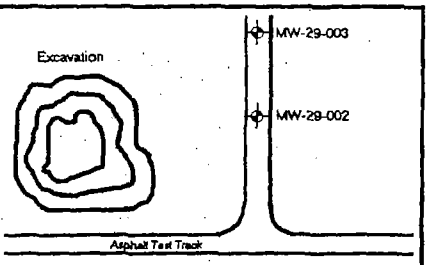

Well: MW-29-002
Elev.: 622.5189

Depth in ft.	DESCRIPTION	USCS	GRAPHIC	PID (ppm)
32	CLAY, 10YR4/1 dark gray, very stiff, very plastic, damp, with medium-to coarse-grained sand and fine- to coarse-grained gravel decreasing with depth until only trace medium-to coarse-grained sand at 40'. Wet at 31'.	CH		0
40	CLAY, 10YR4/1 dark gray, slightly soft, very plastic, moist, with trace medium-to coarse-grained sand and fine- to medium-grained gravel.	CH		0
46	SANDY CLAY, 10YR4/1 dark gray, very soft, slightly plastic, wet, with fine- to coarse-grained sand.	CL		0
48	CLAY, 10YR4/1 dark gray, slightly stiff, very plastic, moist, with some fine- to coarse-grained sand and subangular-rounded fine-grained gravel.	CH		0
54	Decreasing amounts of gravel.	CH		0
60	Very little gravel, wet.	CH		0
64				

Grout

Well Construction Information

GROUT/BACKFILL

Type	: Portland cement/bentonite
Setting	: 0-69'
Proportions	: 50 lbs cement/ 2.5 lbs ben.
Tremmied (y/n)	: y

SEAL

Type	: Volclay/Pure Gold ben.
Setting	: 69-74'
Composition	: 3/8" bentonite pellets
Set-up time	: 15 hours
Tremmied (y/n)	: n

SCREEN

Type	: Global Drilling PVC
Inside Diameter	: 4"
Slot Size	: 0.010"
Setting	: 79-89'

RISER

Type	: PVC
Inside Diameter	: 4"
Schedule	: 40
Setting	: 0-79'
Stickup	: 2.8'

FILTER PACK

Type	: Best Sand Corp. quartz sand
Setting	: 74-89'
Amount used	: 350 lbs.
Tremmied (y/n)	: n

CENTRALIZERS

Type	: Stainless steel
Depth	: 20' and 69'

SURFACE COMPLETION

PROTECTIVE CASING:
Type: Steel
Length: 5'
Diameter: 8"
Setting: 3' AGS to 2' BGS
Drain Hole: Yes

SURFACE PAD:
Dimensions (LWH): 3' x 3' x 0.5'
Material: Concrete

PROTECTIVE POSTS:
Configuration: 4 @ corners of pad
Type: Steel filled with concrete

Notes: Geotech samples collected from 90-93'.
Map file name:
Total Well Depth: 89'

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Well Construction Log MW-29-002

(Page 3 of 3)

United States Army Corps of Engineers
Detroit Arsenal Tank Plant
Detroit, Michigan

Contract Number DACA31-94-D0066
Delivery Order 0007

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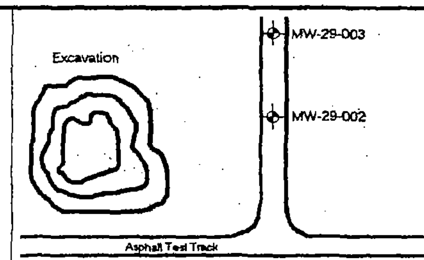
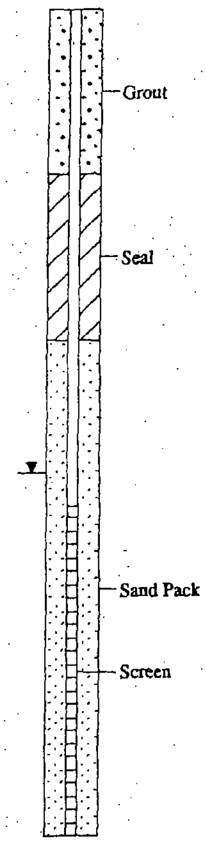


Depth in ft.	DESCRIPTION	USCS	GRAPHIC	PID (ppm)
64–68		CH		0
68–75	SANDY CLAY, 10YR4/1 dark gray, slightly stiff, plastic, moist, with fine- to medium-grained sand, grades into clayey sand at 69', 10YR4/1 dark gray, very stiff, not plastic, poorly sorted, fine- to coarse-grained sand, subangular-subrounded, with subangular-rounded, fine- to medium-grained gravel, cohesive, moist.	CL		0
75–76	SANDY GRAVEL, 10YR4/1 dark gray, moderately sorted, subrounded-rounded, fine-grained gravel, with fine- to medium-grained sand, loose, wet.	GP		0
76–78		SC		
78–81	CLAYEY SAND, 10YR4/1 dark gray, stiff, not plastic, poorly sorted, fine- to coarse-grained sand, with subrounded-rounded, fine- to medium-grained gravel.			0
81–85	GRAVEL with SAND, 10YR3/1 very dark gray, poorly sorted, subangular-well rounded, fine- to coarse-grained gravel, with fine- to medium-grained sand, wet, gravel coarsens slightly with depth.	GP		
85–89	SANDY GRAVEL, 10YR3/1 very dark gray, poorly sorted, well rounded, fine- to medium-grained gravel, with medium-to coarse-grained, well rounded sand, loose, wet.	GP		5.7
89–95	SAND with CLAY, 10YR3/1 very dark gray, well sorted, well rounded, fine- to coarse-grained sand, loose, very slightly plastic, moist. Natural cave-in.	SC		0
95				0

Well: MW-29-002
Elev.: 622.5189



Well Construction Information

GROUT/BACKFILL

Type	: Portland cement/bentonite
Setting	: 0-69'
Proportions	: 50 lbs cement/ 2.5 lbs ben.
Tremmied (y/n)	: y

SEAL

Type	: Volclay/Pure Gold ben.
Setting	: 69-74'
Composition	: 3/8" bentonite pellets
Set-up time	: 15 hours
Tremmied (y/n)	: n

SCREEN

Type	: Global Drilling PVC
Inside Diameter	: 4"
Slot Size	: 0.010"
Setting	: 79-89'

RISER

Type	: PVC
Inside Diameter	: 4"
Schedule	: 40
Setting	: 0-79'
Stickup	: 2.8'

FILTER PACK

Type	: Best Sand Corp. quartz sand
Setting	: 74-89'
Amount used	: 350 lbs.
Tremmied (y/n)	: n

CENTRALIZERS

Type	: Stainless steel
Depth	: 20' and 69'

SURFACE COMPLETION

PROTECTIVE CASING:
Type: Steel
Length: 5'
Diameter: 8"
Setting: 3' AGS to 2' BGS
Drain Hole: Yes

SURFACE PAD:
Dimensions (LWH): 3' x 3' x 0.5'
Material: Concrete

PROTECTIVE POSTS:
Configuration: 4 @ corners of pad
Type: Steel filled with concrete

Notes: Geotech sample collected from 90-93'.
Map file name:
Total Well Depth: 89'

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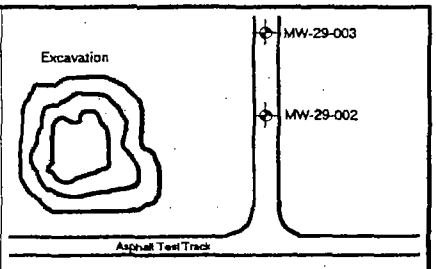
Well Construction Log MW-29-003

(Page 1 of 4)

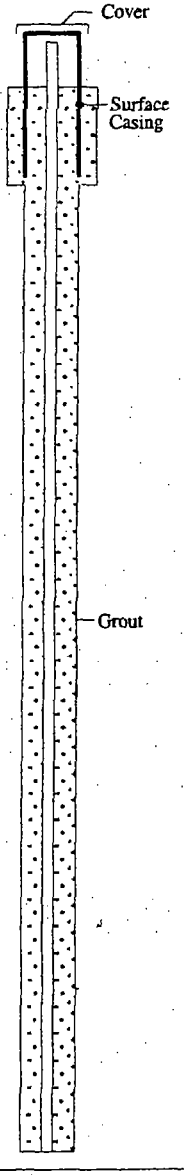
United States Army Corps of Engineers
Detroit Arsenal Tank Plant
Detroit, Michigan

Contract Number DACA31-94-D0066
Delivery Order 0007

Date	: 9/18/00-9/22/00
Drilling Method	: Sonic Drill Rig
Geologist	: K. Tautkus, SAIC
Driller	: S. Johnson, BLA
Helper	: M. Staines, SAIC
Ground Cover	: Bare
Water Level	: 79'
Total Boring Depth	: 95'
Borehole Diameter	: 8"
X, Y Coordinates	: 13482966.0875, 366198.0057



Depth in ft.	DESCRIPTION	USCS	GRAPHIC	PID (ppm)
0	GRAVELLY CLAY, 10YR4/2 dark grayish brown, very stiff, slightly plastic, damp, with subrounded, fine- to coarse-grained gravel, trace sand.	CL		0
2	GRAVELLY SAND, 10YR4/2 dark grayish brown, poorly sorted, angular-subrounded, fine- to very coarse-grained gravel, and fine- to coarse-grained sand, loose, damp.	SP		
4	GRAVELLY SAND, 5YR4/3 reddish brown, poorly sorted, fine- to coarse-grained sand, and subangular-rounded, fine- to coarse-grained gravel, loose, moist.	SP		0
6	SAND, 10YR4/2 dark grayish brown, well sorted, fine- to medium-grained, slightly cohesive, moist.	CL		
8	SANDY CLAY, 10YR2/1 black, very stiff, slightly plastic, damp, with fine-grained sand.	CL		0
10	CLAY, 10YR4/2 dark grayish brown, very stiff, slightly plastic, damp, weathered till with trace sand that decreases with depth.			
12	CLAY, 10YR4/2 dark grayish brown, very stiff, slightly plastic, damp, weathered, with trace fine- to medium-grained sand and subangular-rounded, fine-grained gravel.	CL		0
14	SANDY CLAY with GRAVEL, 10YR4/1 dark gray, very stiff, very slightly plastic, damp, with very thin lenses of fine sand and silt and small pockets of wet clay throughout.			
16				
18		CL		
20				0
22				
24				



Well Construction Information

GROUT/BACKFILL

Type	: Portland cement/bentonite
Setting	: 0-71'
Proportions	: 47 lbs cement/ 2.5 lbs ben.
Tremmied (y/n)	: y

SEAL

Type	: Volclay/Pure Gold ben.
Setting	: 71-76'
Composition	: 3/8" bentonite pellets
Set-up time	: 45 minutes
Tremmied (y/n)	: n

SCREEN

Type	: Global Drilling PVC
Inside Diameter	: 4"
Slot Size	: 0.010"
Setting	: 81-91'

RISER

Type	: PVC
Inside Diameter	: 4"
Schedule	: 40
Setting	: 0-81'
Stickup	: 2.8'

FILTER PACK

Type	: Best Sand Corp. quartz sand
Setting	: 76-91'
Amount used	: 350 lbs.
Tremmied (y/n)	: n

CENTRALIZERS

Type	: Stainless steel
Depth	: 20' and 71'

SURFACE COMPLETION

PROTECTIVE CASING:
Type: Steel
Length: 5'
Diameter: 8"
Setting: 3' AGS to 2' BGS
Drain Hole: Yes

SURFACE PAD:
Dimensions (LWH): 3' x 3' x 0.5'
Material: Concrete

PROTECTIVE POSTS:
Configuration: 4 @ corners of pad
Type: Steel filled with concrete

Notes: Geotech sample collected from 83-85'.
Map file name;
Total Well Depth: 91'

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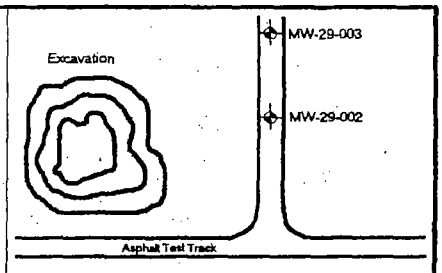
Well Construction Log MW-29-003

(Page 2 of 4)

United States Army Corps of Engineers
Detroit Arsenal Tank Plant
Detroit, Michigan

Contract Number DACA31-94-D0066
Delivery Order 0007

Date	: 9/18/00-9/22/00
Drilling Method	: Sonic Drill Rig
Geologist	: K. Tautkus, SAIC
Driller	: S. Johnson, BLA
Helper	: M. Staines, SAIC
Ground Cover	: Bare
Water Level	: 79'
Total Boring Depth	: 95'
Borehole Diameter	: 8"
X, Y Coordinates	: 13482966.0875, 366198.0057



Depth in ft.	DESCRIPTION	USCS	GRAPHIC	PID (ppm)
24–28		CL		0
30–32	SANDY CLAY with gravel, 10YR4/1 dark gray, very stiff, not plastic, damp, crumbles easily, medium-to very coarse-grained sand and fine-grained gravel.	CL		0
34–38	CLAY with SAND and GRAVEL, 10YR4/1 dark gray, slightly stiff, plastic, moist, with fine-grained sand and subangular-rounded, fine-grained gravel, wet at 40', gravel slightly grades smaller and less with depth.	CL		0
40–48	CLAY, 10YR4/1 dark gray, slightly stiff, very plastic, wet, with decreasing fine- to medium-grained sand and trace fine gravel until 44'.	CH		0

Well: MW-29-003
Elev.: 621.8205

Well Construction Information

GROUT/BACKFILL

Type	: Portland cement/bentonite
Setting	: 0-71'
Proportions	: 47 lbs cement/ 2.5 lbs ben.
Tremmied (y/n)	: y

SEAL

Type	: Volclay/Pure Gold ben.
Setting	: 71-76'
Composition	: 3/8" bentonite pellets
Set-up time	: 45 minutes
Tremmied (y/n)	: n

SCREEN

Type	: Global Drilling PVC
Inside Diameter	: 4"
Slot Size	: 0.010"
Setting	: 81-91'

RISER

Type	: PVC
Inside Diameter	: 4"
Schedule	: 40
Setting	: 0-81'
Stickup	: 2.8'

FILTER PACK

Type	: Best Sand Corp. quartz sand
Setting	: 76-91'
Amount used	: 350 lbs.
Tremmied (y/n)	: n

CENTRALIZERS

Type	: Stainless steel
Depth	: 20' and 71'.

SURFACE COMPLETION

PROTECTIVE CASING:
- Type: Steel
- Length: 5'
- Diameter: 8"
- Setting: 3' AGS to 2' BGS
- Drain Hole: Yes

SURFACE PAD:
- Dimensions (LWH): 3' x 3' x 0.5'
- Material: Concrete

PROTECTIVE POSTS:
- Configuration: 4 @ corners of pad
- Type: Steel filled with concrete

Notes: Geotech sample collected from 83-85'.
Map file name:
Total Well Depth: 91'

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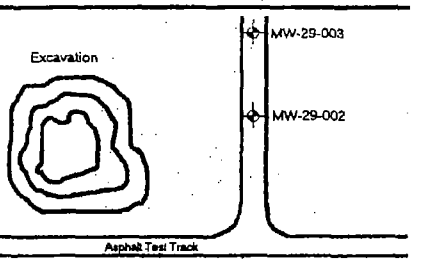
Well Construction Log MW-29-003

United States Army Corps of Engineers
Detroit Arsenal Tank Plant
Detroit, Michigan

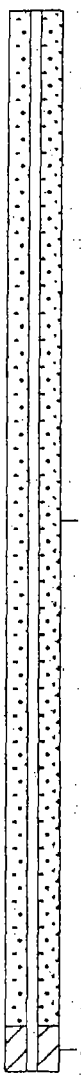
Contract Number DACA31-94-D0066
Delivery Order 0007

Date	: 9/18/00-9/22/00
Drilling Method	: Sonic Drill Rig
Geologist	: K. Tautkus, SAIC
Driller	: S. Johnson, BLA
Helper	: M. Staines, SAIC
Ground Cover	: Bare
Water Level	: 79'
Total Boring Depth	: 95'
Borehole Diameter	: 8"
X, Y Coordinates	: 13482966.0875, 366198.0057



Well: MW-29-003
Elev.: 621.8205

Depth in ft	DESCRIPTION	USCS	GRAPHIC	PID (ppm)
48				
50				0
52				
54		CH		0
56				
58				
60	CLAY, 10YR4/1 dark gray; slightly hard, very plastic, moist, with some fine sand and trace fine- to medium-grained gravel.			0
62				
64		CH		0
66				
68				
70	CLAYEY SAND with GRAVEL, 10YR4/1 dark gray, poorly sorted, hard, slightly plastic, fine- to medium-grained sand and gravel, trace silt.	SC		0
		CL		
72				



Well Construction Information

GROUT/BACKFILL

Type	: Portland cement/bentonite
Setting	: 0-71'
Proportions	: 47 lbs cement/ 2.5 lbs ben.
Tremmied (y/n)	: y

SEAL

Type	: Volclay/Pure Gold ben.
Setting	: 71-76'
Composition	: 3/8" bentonite pellets
Set-up time	: 45 minutes
Tremmied (y/n)	: n

SCREEN

Type	: Global Drilling PVC
Inside Diameter	: 4"
Slot Size	: 0.010"
Setting	: 81-91'

RISER

Type	: PVC
Inside Diameter	: 4"
Schedule	: 40
Setting	: 0-81'
Stickup	: 2.8'

FILTER PACK

Type	: Best Sand Corp. quartz sand
Setting	: 76-91'
Amount used	: 350 lbs.
Tremmied (y/n)	: n

CENTRALIZERS

Type	: Stainless steel
Depth	: 20' and 71'

SURFACE COMPLETION

PROTECTIVE CASING:
Type: Steel
Length: 5'
Diameter: 8"
Setting: 3' AGS to 2' BGS
Drain Hole: Yes

SURFACE PAD:
Dimensions (LWH): 3' x 3' x 0.5'
Material: Concrete

PROTECTIVE POSTS:
Configuration: 4 @ corners of pad
Type: Steel filled with concrete

Notes: Geotech sample collected from 83-85'.
Map file name:
Total Well Depth: 91'

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Well Construction Log MW-29-003

(Page 4 of 4)

United States Army Corps of Engineers
Detroit Arsenal Tank Plant
Detroit, Michigan

Contract Number DACA31-94-D0066
Delivery Order 0007

Date	: 9/18/00-9/22/00
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Borehole Diameter	: 8"
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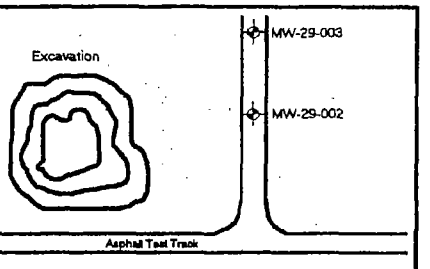
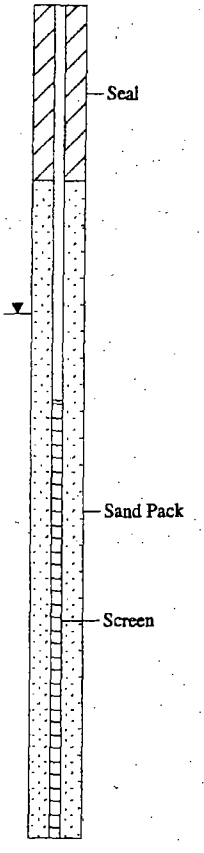


Well: MW-29-003
Elev.: 621.8205

Depth in ft.	DESCRIPTION	USCS	GRAPHIC	PID (ppm)
72	CLAY with SAND, 10YR4/1 dark gray, very soft, very plastic, wet, with fine sand, trace subangular-subrounded, fine- to medium-grained gravel.	CL		
74	CLAYEY SAND with GRAVEL, 10YR4/1 dark gray, poorly sorted, very stiff, fine- to coarse-grained sand with subangular- rounded, fine- to medium-grained gravel, moist.	SC		0
76	CLAYEY SAND with GRAVEL, 10YR4/1 dark gray, moderately well sorted, fine- to medium-grained sand with subrounded- rounded, fine-grained gravel, soft, slightly plastic, very moist-wet.	SC		
78				
80	GRAVELLY SAND, 10YR4/1 dark gray, moderately sorted, fine- to coarse-grained sand with subrounded-rounded, fine-grained gravel, loose, very moist.	SP		0
82				
84				
86				0
88				
90	SAND, 10YR4/1 dark gray, well sorted, fine-grained, slightly cohesive, very moist, trace clay.	SP		0
92	eAND, 10YR4/1 dark gray, moderately sorted, medium-to coarse-grained, loose, wet, trace fine gravel and clay. Natural cave-in.	SP		
94				
96				0



Well Construction Information

GROUT/BACKFILL

Type	: Portland cement/bentonite
Setting	: 0-71'
Proportions	: 47 lbs cement/ 2.5 lbs ben.
Tremmied (y/n)	: y

SEAL

Type	: Volclay/Pure Gold ben.
Setting	: 71-76'
Composition	: 3/8" bentonite pellets
Set-up time	: 45 minutes
Tremmied (y/n)	: n

SCREEN

Type	: Global Drilling PVC
Inside Diameter	: 4"
Slot Size	: 0.010"
Setting	: 81-91'

RISER

Type	: PVC
Inside Diameter	: 4"
Schedule	: 40
Setting	: 0-81'
Stickup	: 2.8'

FILTER PACK

Type	: Best Sand Corp. quartz sand
Setting	: 76-91'
Amount used	: 350 lbs.
Tremmied (y/n)	: n

CENTRALIZERS

Type	: Stainless steel
Depth	: 20' and 71'

SURFACE COMPLETION

PROTECTIVE CASING:
Type: Steel
Length: 5'
Diameter: 8"
Setting: 3' AGS to 2' BGS
Drain Hole: Yes

SURFACE PAD:
Dimensions (LWH): 3' x 3' x 0.5'
Material: Concrete

PROTECTIVE POSTS:
Configuration: 4 @ corners of pad
Type: Steel filled with concrete

Notes: Geotech sample collected from 83-85'.
Map file name:
Total Well Depth: 91'

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Content Checklist For Five-Year Review Reports

This checklist may be used by you, your managers, etc., to verify that you have included all of the appropriate information in your Five-Year Review report. Depending on site-specific circumstances, some items may not be applicable. For example, a report for a site just beginning construction will generally contain less data than for a site that has reached construction completion.

General Report Format

- Signed concurrence memorandum (as appropriate)
- Title page with signature and date
- Completed five-year review summary form (page E-15)
- List of documents reviewed
- Site maps (as appropriate)
- List of tables and figures
- Interview report (as appropriate)
- Site inspection checklist
- Photos documenting site conditions (as appropriate)

Introduction

- The purpose of the five-year review
- Authority for conducting the five-year review
- Who conducted the five-year review (lead agency) and when
  - Organizations providing analyses in support of the review (*e.g.*, the contractor supporting the lead agency)
  - Other review participants or support agencies
- Review number (*e.g.*, first, second)
- Trigger action and date
- Number, description, and status of all operable units at the site
- If review covers only part of a site, explain approach
  - Define which areas are covered in the five-year review
  - Summarize the status of other areas of the site that are not covered in the present five-year

Site Chronology

List all important site events and relevant dates (*e.g.*, date of initial discovery of problem, dates of pre-NPL responses, date of NPL listing, etc.)

Background

- General site description (*e.g.*, size, topography, and geology)
- Former, current, and future land use(s) of the site and surrounding areas
- History of contamination
- Initial response (*e.g.*, removals)
- Basis for taking remedial action (*e.g.*, contaminants)

Remedial Actions

- Regulatory actions (*e.g.*, date and description of Records of Decision, Explanations of Significant Difference, Administrative Orders on Consent, Consent Decrees and Action Memorandum)
- Remedial action objectives
- Remedy description
- Remedy implementation (*e.g.*, status, history, enforcement actions, performance)
- Systems operations/Operations & Maintenance
  - Systems operations/O&M requirements
  - Systems operations/O&M operational summary (*e.g.*, history, modifications, problems, and successes)
  - Summary of costs of system operations/O&M effectiveness (*i.e.*, are requirements being met and are activities effective in maintaining the remedy?)

Progress Since Last Five-Year Review (if applicable)

- Protectiveness statements from last review
- Status of recommendations and follow-up actions from last review
- Results of implemented actions, including whether they achieved the intended effect
- Status of any other prior issues

Five-Year Review Process

1. Administrative Components
   - Notification of potentially interested parties of initiation of review process
   - Identification of five-year review team members (as appropriate)
   - Outline of components and schedule of your five-year review
2. Community Involvement
   - Community notification (prior and post review)
   - Other community involvement activities (*e.g.*, notices, fact sheets, etc., as appropriate)
3. Document review
4. Data review
5. Site inspection
   - Inspection date
   - Inspection participants

Five-Year Review Process, cont'd.

- Site inspection scope and procedures
- Site inspection results, conclusions
- Inspection checklist

6. Interviews
   - Interview date(s) and location(s)
   - Interview participants (name, title, etc.)
   - Interview documentation
   - Interview summary

Technical Assessment

Answer Question A: Is the remedy functioning as intended by the decision documents?

- remedial action performance (*i.e.*, is the remedy operating as designed?)
- system operations/O&M
- cost of system operations/O&M
- opportunities for optimization
- early indicators of potential issues
- implementation of institutional controls and other measures

Answer Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

- changes in standards, newly promulgated standards, TBCs
- expected progress towards meeting RAOs
- changes in exposure pathways
- changes in land use
- new contaminants and/or contaminant sources
- remedy byproducts
- changes in toxicity and other contaminant characteristics
- risk recalculation/assessment (as applicable)

Answer Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

- new or previously unidentified ecological risks
- natural disaster impacts
- any other information that could call into question the protectiveness of the remedy

Technical Assessment Summary

Issues

Issues identified during the technical assessment and other five-year review activities

- Determination of whether issues affect current or future protectiveness

Issues, cont'd.

- A discussion of unresolved issues raised by support agencies and the community (States, Tribes, other Federal agencies, local governments, citizens, PRPs, other interested parties), if applicable

Recommendations and Follow-up Actions

- Required/suggested improvements to identified issues or to current site operations
- Note parties responsible for actions
- Note agency with oversight authority
- Schedule for completion of actions related to resolution of issues

Protectiveness Statements

- Protective statement(s) for each OU (If the remedy is not protective of human health and/or the environment, have you provided supporting discussion and information in the report to make this determination, such as current threats or level of risk?)
- Comprehensive protectiveness statement covering all of the remedies at the site (if applicable)

Next Review

Expected date of next review

If five-year reviews will no longer be done, provide a summary of that portion of the technical analysis presented in the report that provides the rationale for discontinuation of five-year reviews.